Environmental Assessment

For

Fulton Branch Project

Responsible Agency:
U.S. Forest Service
Ouachita National Forest
Caddo-Womble Ranger District

Responsible Official:
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This project is subject to subparts A and B of *36 CFR Part 218 Project-Level Pre-decisional Administrative Review Process* (objection process); it is not authorized under the Healthy Forest Restoration Act (HFRA).

August 2019

TABLE OF CONTENTS

LISTING OF FIGURES & TABLES

Chapter 1
Purpose and Need for the Proposed Action

Proposed Action

The Caddo-Womble Ranger District proposes to implement the following management activities*:

- Seed tree regeneration harvest – 304 acres
- Seed tree connected actions – 304 acres:
    - Prescribed burn/chemical/mechanical/manual site preparation for natural regeneration
    - Chop/rip site preparation for artificial regeneration (if needed)
    - Hand plant shortleaf pine seedlings (if needed)
    - Timber stand improvement – release (chemical/manual)
    - Timber stand improvement – precommercial thinning
- Commercial thinning – 1,042 acres
- Commercial thinning (plantation) – 182 acres
- Commercial thinning (woodland development) – 902 acres
- Timber stand improvement (precommercial thinning) – 132 acres
- Wildlife opening maintenance – 50 acres
- Pond maintenance – 25 each
- Glade restoration – 170 acres
- Nest boxes – 35 each
- Fuel reduction/ecosystem prescribed burn – 11,500 acres
- Fireline construction – 7 miles
- Fireline reconstruction – 27 miles
- System road reconstruction – 12 miles
- Temporary road construction – 14 miles
- System road decommission – 7 miles
- Existing roads to add to National Forest System – 2.3 miles
- Existing roads to open seasonally (October – February) - 0.63 miles
- Trail relocation – 0.5 miles
- Watershed improvement – throughout project area
- Non-native invasive species control – throughout project area

*All quantities are approximate; treatment acres would be less due to avoided slopes and/or streamside management areas.

The project area is located approximately 2 1/2 miles North of Mount Ida, Arkansas in Montgomery County in T1S R24&25W and T2S R24&25W. The 11,330-acre project area contains 8,838 acres of National Forest System lands. Proposed actions would occur in Management Areas (MAs) 14, 16, 20, and 21.

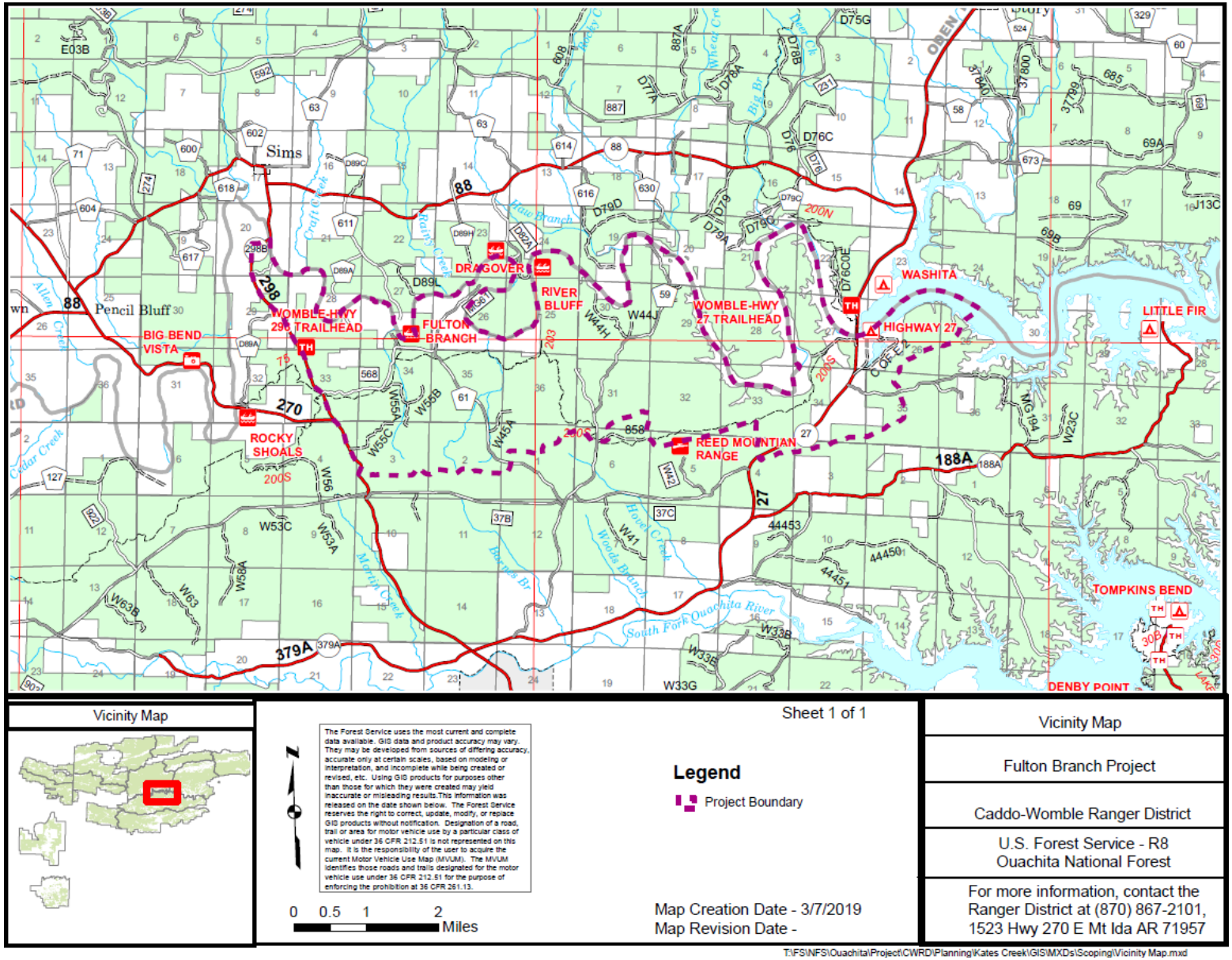

FIGURE 1. VICINITY MAP

Ouachita National Forest
Arkansas and Oklahoma

Purpose of the Action

Overall guidance for this action is found in the 2005 Revised Land and Resource Management Plan for the Ouachita National Forest (Revised Forest Plan). The primary goal of the Revised Forest Plan is to promote diverse, healthy, productive, and sustainable ecosystems. The purpose of this action is to promote the health and vigor of the project area by providing for a diversity of plant and animal communities, creating early seral habitat, reducing fuel accumulation, and producing a sustainable yield of wood products.

Need for the Action

- Past fire suppression activities have removed the natural role of fire from the landscape. This absence of fire has resulted in excessive fuel accumulations, increasing the risk of damage to resources in the event of wildfire.
- Fire is a natural ecosystem process needed to reduce density of understory woody species and maintain the needed light environment that promotes the growth of wildlife foods, the natural regeneration of pine and oak, and the conditions for plants adapted to fire.
- Pine and hardwood stands contain damaged, poorly formed, and diseased trees. The trees are overcrowded or densely stocked, reducing growth and crown development. These conditions result in stress and reduced vigor and health, thus increasing susceptibility to insects and disease.
- There is limited access to those stands in need of silvicultural treatment, resulting in the need for new road construction. Some existing roads are not useable and create the need for road re-construction to access timber.
- There is a lack of high quality forage and a lack of nesting habitat for species requiring early successional habitat.
- There are known populations of exotic and invasive plant species, and possibly hogs, throughout the project area resulting in the need for Non-native Invasive Species control and habitat protection.
- The project includes several recreation sites, trails and areas identified as high scenic integrity along the Ouachita River. Scenic values need to be maintained within these areas.
- There are known locations of glades throughout the project area that are in need of being restored and protected.

Existing Versus Desired Conditions

Contrasts between existing and desired conditions, as well as management activities designed to meet project objectives, are shown in Table 1.1. These management activities were determined to be within the scope of this analysis. Project activities would move the existing conditions toward the desired conditions as referenced in the Revised Forest Plan. Within the Proposed Management Activities column, the acres outlined for specific treatments are often given in total acres within a stand. **Sensitive areas such as riparian or steep slopes would be avoided, resulting in fewer actual acres disturbed.**

EXISTING CONDITIONS CONTRASTED TO DESIRED CONDITIONS (TABLE 1.1)

Desired Conditions	Existing Conditions	Site Specific Needs	Proposed Management Activities
Improve forest health by reducing the likelihood of insect infestations, disease outbreaks, and establishment of non-native invasive species on National Forest System Lands (Revised Forest Plan, pp. 58).	45% of pine, pine-hardwood, hardwood and hardwood-pine stands are above the age of 70. This combined with overstocked conditions reduces the health and vigor of the stands and increases their susceptibility to damage from insects and disease.	Reduce basal area levels in stands that are overstocked. Reduce the percentage of older age classes in the project area. Provide healthy, young, vigorous stands.	304 acres of seed tree regeneration harvest 1,042 acres of commercial thinning 182 acres of plantation thinning 902 acres of woodland development 436 acres of precommercial thinning NNIS treatment throughout the project area
Contribute to the economic base of local communities by providing a sustained yield of high-quality wood products at a level consistent with sound economic principles, local market demands, and desired ecological conditions. (Revised Forest Plan, p. 68)	Pine plantations and other overstocked stand contain damaged and poorly formed trees. These areas are also densely stocked which results in reduced growth and crown development. These conditions result in poor quality wood products.	Reduce basal area levels in pine plantations and other overstocked stands.	1,042 acres of commercial thinning 182 acres of plantation thinning 902 acres of woodland development
Reduce fuel loads on the National Forest System Lands that have the greatest potential for catastrophic wildland fire. (Revised Forest Plan p. 68)	Fire suppression has resulted in excessive fuel accumulations, increasing the risk of damage to resources in the event of wildfire.	Minimize the risk of resource damage by reducing fuel loadings.	11,500 acres of prescribed burning

Desired Conditions	Existing Conditions	Site Specific Needs	Proposed Management Activities
Within MA 14 and 16, grass-forb and seedling-sapling conditions are well represented, particularly in the portions suitable for timber management where they make up at least 6% of the landscape; and 3% in MA 21 (Revised forest Plan, p. 68) Limit even-aged regeneration cutting in each project area to no more than 14% of suitable acres managed under even-aged prescriptions, per 10-year entry except for 6% in MA 21 (Revised Forest Plan, WF002 p.78)	There are 4,262 acres of suitable land within MA 14, 1,694 within MA 16 and 1,431 acres within MA 21; there are 87 acres (1%), in early seral (0-10 age year) habitat.	Provide at least 255 acres but not more than 597 acres in MA 14, at least 101 acres but not more than 237 acres in MA 16 and at least 42 acres but not more than 86 acres in MA 21 of early seral (grass-forb or seedling-sapling) conditions.	304 acres of seed tree regeneration harvest
Provide for a diversity of plant and animal communities throughout the planning area. • Improve habitat for game and non-game species (Revised Forest Plan, OBJ01 p. 20 • Manage for identified natural plant communities. (Revised Forest Plan pp. 6-19) • Increase prescribed burning on the forest to help achieve and maintain desired future conditions. (Revised Forest Plan, OBJ01 p. 59)	Due to past fire suppression activities, the natural role of fire has been removed from the landscape. This has limited the amount of open understories necessary for wildlife foods, the lack of natural regenerations of pine and oak species, and the loss of habitat conditions for fire adapted pant species	Increase fire frequency to meet desire intervals for various ecosystems present in the project area. Remove the understory for wildlife forage.	11,500 acres of prescribed burning 170 acres of glade restoration
Where open habitats are not provided by other conditions, develop permanent wildlife opening, one to five acres per 160 acres of habitat. (Revised Forest Plan, WF008 p.78)	There is a lack of high quality forage and a lack of nesting habitat for species requiring early seral habitat.	Provide permanent open habitat for foraging and nesting within the project area.	50 acres of wildlife opening maintenance
Develop and operate the minimum road system, maintained to the minimum standard needed to meet the requirements of proposed	There is no access to some of the stands proposed for harvest and silvicultural activities. Some of the	Provide access to stands in need of silvicultural treatment. Improve road conditions on travel ways proposed for	12 miles of system road reconstruction 14 mile of temporary road

Desired Conditions	Existing Conditions	Site Specific Needs	Proposed Management Activities
actions, protect the environment and provide for reasonable and safe access. (Revised Forest Plan p. 67)	roads would not support timber hauling in their current condition.	timber hauling.	construction
Treat forest to eliminate non-native, invasive species. (Revised Forest Plan, OBJ03 p. 59)	Non-native, invasive species present within the project area include *Sericea lespedeza* and *Albizia julibrissin*	Treat non-native, invasive species throughout the project area	Non-native invasive species control throughout the project
Maintain or improve watershed health. Conduct watershed improvement on at least 40 acres per year. (Revised Forest Plan, OBJ14, OBJ15, p.62)	Roads, unclassified trails, and other areas have been identified as having active erosion.	Fish passage is impeded due to eroded culverts, illegal dump sites are in need of clean up, and resource damage is in need of repair along roads and gravel pits.	Watershed restoration treatment throughout the project area
Identify roads and trails that should be decommissioned to reduce sediment. (Revised Forest Plan, p. 62)	Through travel analysis, routes have been identified that are not needed.	Remove unneeded routes from the system. Change motorized use designation to closed for routes remaining on the system (administrative use).	7 miles of road decommissioning

Scope of This Environmental Analysis

History of the Scoping and Planning Process

A project announcement letter requesting comments on the proposal was mailed to interested agencies, groups and individuals on March 8, 2019. The project was also published in the Ouachita National Forest Schedule of Proposed Actions. No responses were received.

Relevant Planning Documents

The following documents directly influence the scope of this environmental analysis:

- Revised Land and Resource Management Plan for the Ouachita National Forest (Revised Forest Plan, USDA Forest Service, 2005a), and the accompanying Final Environmental Impact Statement (FEIS, USDA Forest Service, 2005b)
- Travel Analysis Report for the Fulton Branch Project
- Fulton Branch Project Scenery Analysis

The Revised Forest Plan guides all natural resource management activities for the Ouachita National Forest. The forest management direction, communicated in terms of

Desired Conditions (pp. 6-26); Strategies (pp. 27-72); and Design Criteria (pp. 73-123) that apply to the forest lands identified in this proposal are incorporated by reference.

The treatments described in the Fulton Branch Project Environmental Assessment are consistent with the management direction of the Revised Forest Plan and are typical of those for which environmental effects are disclosed in the FEIS.

Issues

No site-specific concerns were raised during scoping; no issues were developed to be analyzed in depth.

Decisions to Be Made

The District Ranger must decide which alternative to select. The District Ranger must also determine if the selected alternative would or would not be a major Federal action, significantly affecting the quality of the human environment.

Chapter 2
Alternatives Including the Proposed Action

Alternatives Documented in Detail

No Action

In this alternative, no management activities other than those previously permitted and approved activities would continue in the project area:

- Road maintenance – normal and emergency road maintenance would continue on all existing roads.
- Power line right of way (ROW) maintenance would continue on existing ROW's.
- Fire suppression – natural caused fires may be suppressed unless appropriate conditions allow for it to be used as a management tool to accomplish resource needs. Human-caused fires by accident or intention (arson) would be suppressed.
- Off road vehicle use – ORV use of the area would continue under the Travel Management Project for the Ouachita National Forest.
- Camping would continue under the current rules of the Ouachita National Forest. Special restrictions would apply during times of wildfire threat.
- Hunting and Fishing would continue under the rules of the Arkansas Game and Fish Commission.
- Firewood cutting would continue under the permitting rules of the Ouachita National Forest, the public would continue to harvest firewood.
- Rock gathering would continue under the permitting rules of the Ouachita National Forest, the public would continue to collect rock for personal use.
- Maintenance of previously established wildlife openings would occur.
- Existing quartz, shale and gravel mining would continue in approved locations.

Proposed Action

Description of Treatments (See Appendix A for list of activities by compartment and stand. See Appendix B for maps displaying activity locations. See Appendix C for Roads to be Decommissioned or Reconstructed).

Seed tree regeneration harvest – A timber harvest cut designed to obtain natural regeneration from seed trees left for that purpose. Approximately 10-15 sq. ft. of pine, 5-10 sq. ft. of hardwood basal area per acre is retained in the overstory. Seed trees are retained indefinitely. This cut would establish a two-aged stand. Seed tree harvest will be completed between June-December to allow for scarification of the ground directly before/during the falling of the seed in the fall. This treatment differs from a traditional seed tree by retaining a mix of hardwoods and pines in the overstory after regeneration. Trees harvested in these areas may be utilized for public firewood or commercial sale.

To facilitate natural pine regeneration, adequate site preparation is needed to disturb the soil surface in the newly created openings. Competing vegetation may be removed manually with chainsaws, heavy equipment, scarifying, ripping, prescribed fire, herbicide application and/or the use of a large steel drum pulled behind a bulldozer to chop. If warranted, the herbicide triclopyr, imazapyr, imazapic and/or glyphosate may be applied using either hack-and-squirt or foliar spray by hand method. Prescribed fire will be employed in late summer/early fall months for best results. However, prescribed burning may be conducted during the winter or early spring months to combine activities with other wildlife habitat/fuel reduction prescribed burning. When burning is not possible, a mechanical treatment such as scarification or ripping of the area may be used. When possible, site preparation activities will coincide with adequate cone crops. If after five years there are fewer than 150 pine seedlings per acre, the area will be hand planted with genetically improved shortleaf pine seedlings. Where established regeneration is present, seedlings may regenerate too densely causing overcrowded conditions, requiring precommercial thinning and/or release.

Prescribed burn site preparation - After chemical or mechanical site preparation activities have been conducted, prescribed burning may be employed in the even-aged regeneration harvest areas. This treatment would further reduce brush, downed-woody fuels, and duff and litter accumulations that may impede regeneration establishment. A detailed description of burning is provided later in this document under ecosystem prescribed burning.

Chemical site preparation - After pine regeneration harvest, hardwoods would be reduced to 20% of the residual basal area of pine using herbicide application in the form of foliar spray, stem injection, and/or chainsaw fell and cut surface spray. A minimum of 5 square feet per acre of basal area of overstory hardwoods would be retained where available. In modified seed tree harvest areas one-half acre clumps of hardwoods per 20 acres of harvest area would be retained in order to create den trees. These areas may be made available for firewood or commercial sale.

Mechanical/manual site preparation - Competing vegetation may be removed manually with chainsaws, heavy equipment and/or ripping. This will be used in lieu of or in addition to other site prep methods to ensure areas are properly prepared for future seed/seedlings. These areas may be made available for firewood or commercial sale.

Chop/rip site preparation for artificial regeneration – Chopping consists of pulling a rolling chopper with a bulldozer over the site to reduce competing vegetation before burning and planting. Ripping is accomplished by using a bulldozer pulling a shank through the soil to encourage root development and allow moisture to penetrate the soil.

Hand plant shortleaf pine - Hand planting of shortleaf pine seedlings will be 8 X 10 spacing. If adequate amounts of pine regeneration (150 trees per acre) are not established, within 5 years in natural regenerated areas, these areas would be chopped, ripped and pine seedlings would be re-planted to meet target stocking levels.

Timber stand improvement – release (chemical/manual) - Regenerated pine stands between 5 and 10 years of age would be thinned to a maximum of 700 trees per acre, averaging a 10 x 10 foot spacing, using hand tools or herbicide application as described on the previous page. Leave trees would be free of all competing vegetation such as vines and woody stems to ensure survival, reduced susceptibility to insects and disease, and increase growth of the residual stand. Poorly formed trees would also be removed. This may be accomplished manually with hand tools (e.g. chainsaws) or with the herbicides applied as a foliar spray or cut surface application to remove the overtopping and competing vegetation and brush. A foliar spray may be applied to areas with vegetation less than six feet tall and with pine regeneration that does not require thinning. A cut surface application is employed in areas with vegetation greater than six feet tall and/or with pine regeneration requiring thinning. During any activities, sufficient hardwood trees would be left scattered throughout the stand to ensure a 10 to 30 percent hardwood component in the stand. When selecting hardwood trees, preference would be given to mast producers. Final stocking after treatments would be 250-500 pine stems per acre. These areas may be made available for commercial sale**.**

Timber stand improvement – precommercial thinning – To reduce competition in overstocked, immature pine stands, trees would be cut to an average 10 x 10 foot spacing, using hand tools. Leave trees would be free of all competing vegetation such as vines and woody stems to ensure survival, reduced susceptibility to insects and disease, and increase growth of the residual stand. Poorly formed trees would also be removed.

Commercial thinning - Stands are thinned to a total residual basal area of 60-70 square feet per acre based on the average stand diameter and community type as listed in Table 3.6 Thinning Guide by Community Group (Revised Forest Plan). Damaged, diseased, suppressed, and poorly formed trees would be targeted first for removal. These areas may be made available for commercial sale. Hardwood would be thinned and would be made available for commercial or firewood sale.

Commercial thinning (plantation) - Densely stocked loblolly and shortleaf pine plantations would be thinned to a residual basal area of 50-60 square feet per acre. For mechanical harvesting equipment to operate within these stands and to reduce the amount of damage to the remaining stand, a minimum spacing between trees of 18 to 20 feet is required. These stands, with average diameters less than 10 inches will be thinned below the basal area guides listed in Table 3.6 Thinning Guide by Community Group (Revised Forest Plan). Pursuant to Revised Forest Plan Design Criteria FI005, deviations from these guides are allowable if site-specific conditions warrant, subject to approval by the project Responsible Official. Stands with an average diameter of six inches would be thinned to a basal area of 30 square feet. Damaged, diseased, suppressed, and poorly formed trees would be targeted first for removal. These stands are subject to severe Southern pine and Ips engraver beetle hazards. Should an outbreak of either pest occur, control would be extremely difficult with expectations of large outbreaks and severe damage to these and adjacent stands. Control of wildfires in dense stands such as these is extremely difficult. Firelines are difficult to construct and the dense stands present dense vertical as well as horizontal fuels. Few hardwoods have been able to compete with the

dense and vigorously growing pine. The appearance of these stands is a very dense monoculture of pine timber. These areas may be made available for commercial sale. Hardwood, if present, would be thinned and made available for commercial or firewood sale.

Commercial thinning (woodland development) - Using a combination of fire, chainsaws, and/or herbicides; the overall basal area will be reduced as listed in Table 3.6 Thinning Guide by Community Group (Revised Forest Plan) to allow for the development of a grass/forb understory. These areas may be made available for firewood or commercial sale. Subsequent treatments would be required whenever there are more than 150 seedlings per acre over three feet tall covering more than half the area or whenever grass/forbs comprise less than half of the ground cover.

Timber stand improvement (precommerical thinning established stands) – This treatment would be the same as previously described for the future regenerated pine stands resulting from the proposed seed tree harvests, except treatment would occur on already regenerated stands currently existing within the project area from previous harvests.

Wildlife opening maintenance – Activities would include timber harvest, brush hogging, disking, fertilizing, and seeding existing wildlife openings with native warm and cool season grasses and forbs. These areas may be made available for firewood or commercial sale.

Pond maintenance - Activities would include repairing spillways, improving parking areas, installing signs, building fishing piers, clearing vegetation, and restocking of native fish species. Traditional methods of controlling nuisance vegetation within and surrounding ponds have proven unsuccessful or impracticable. With Forest Supervisor approval, after site-specific analysis, the use of aquatic labeled herbicides would be used to control invasive or nuisance aquatic vegetation.

Glade Restoration – Using a combination of fire, chainsaws, and/or herbicides; the number of seedlings/saplings in the understory will be reduced to allow for the development of a grass/forb ground cover and invasive species control. Maintenance of these areas would include prescribed burning, invasive species control and periodic mechanical thinning of woody species as needed. These areas may be made available for firewood or commercial sale.

Nest Boxes - Where suitable natural cavities do not occur, nesting structures would be installed across the project area to provide habitat for cavity-nesting animals.

Fuel reduction/ecosystem prescribed burning – This activity would be implemented during the dormant and growing seasons (described below). Proposed burn areas would be burned as needed to reach a natural fire regime in this area. Areas are currently in a Condition Class 2 and 3 with the objective to reach and maintain Condition Class 1. The prescribed burn frequency is based on the current fuel loads, the priority of the unit and reasonable accessibility to achieve the desired condition. These are also considered when determining timing or season and intensity of the prescribed burn.

In order to minimize fireline construction, some of the burn blocks extend beyond the project area to utilize natural or existing man-made fuel breaks such as streams and roads.

> **Growing season prescribed burning** – These burns are implemented during the spring and summer months between leaf emergence in late March and April and leaf fall in late October and November. The burns involve application of controlled, low to moderate intensity fire to control competing vegetation (hardwoods), prepare sites for seeding, and perpetuate fire dependent species (shortleaf pine – bluestem). Vegetation three inches and less in diameter at the ground level is targeted for eradication; however, some larger diameter vegetation may be damaged. This will result in less competition for pine seedlings and other desirable fire-dependent species while creating an open understory to stimulate growth of native grasses and forbs and increased foraging opportunities for browsing animals.
>
> **Dormant season prescribed burning** – These burns are implemented after leaf fall and before leaf emergence during late fall and winter months. Moderate to high intensity fire is employed to reduce accumulated fuels, stimulate growth of native vegetation, and improve wildlife habitat. Approximately 80 percent of the area is burned with expected fuel reduction of approximately 30 percent. Some duff would be retained for soil protection. Some larger vegetation may be lost, however, two inches in dbh and less in diameter is targeted for reduction to create an open understory, stimulating growth of native grasses and forbs, and increased foraging opportunities for browsing animals.

Fireline construction – A line up to 10-feet wide would be bladed to bare minimum soil using a bulldozer, removing ground vegetation and small trees. The fireline would meander around large trees, leaving them in place. After the burns are completed, these firelines would be waterbarred and seeded with native grasses and forbs where needed to restore vegetative cover to the exposed soil.

Fireline reconstruction – Up to a 10-foot wide swath of brush and ground vegetation would be removed from existing firelines by blading using a bulldozer. After the burns are completed, these firelines would be waterbarred and seeded with native grasses and forbs where needed to restore vegetative cover to the exposed soil.

System road reconstruction – System road reconstruction would be required to support management activities, reduce erosion and sedimentation, and ensure safe travel on the

existing road network. Activities could include any road improvements or realignment that results in an increase of an existing road's traffic service level, expands its capacity, changes its original design function, or relocates an existing road or portions of an existing road and treatment of the old roadway.

Temporary road construction – Temporary road construction is necessary to access harvest areas. Per Revised Forest Plan design criteria, temporary roads would be decommissioned, revegetated, and re-contoured upon termination of management activity. After harvest, these roads would be closed with earthen berms or gates, fertilized, seeded and planted with native warm and cool season grasses and nonpersistent cultivars and utilized as temporary wildlife openings.

System road decommission – Various treatments applied to unneeded roads: re-establishing vegetation and drainage patterns, stabilizing slopes, blocking road entrance, installing water bars, removing culverts, scattering slash and eliminating the roadbed.

Existing roads to add to National Forest System – Roads that are currently being used and maintained and were never part of the National Forest System.

Existing roads to open seasonally (October – February) – Roads that are currently closed in the National Forest System that will be opened seasonally from October through the end of February.

Trail relocation – the existing trail is poorly located and will be moved for safety or erosion control.

Watershed Improvement – Roads, trails, gravel pits, and areas with active erosion would be stabilized. Disturbed soil areas would be re-vegetated with native species, water barred and fertilized. Identified dump sites would be cleaned up and rehabilitated.

Non-native Invasive Species Control – Identified invasive species, but not limited to, fescue, Japanese honeysuckle, stiltweed, Chinese privet, multi-flora rose) would be eliminated from the road surface, ditches, and forest floor throughout the project area using various techniques. These techniques would include a combination of herbicide application, prescribed burning, light disking, and seeding with native warm season grasses.

No Herbicide Use

This alternative addresses Forest direction requiring analysis of an alternative to herbicide use when feasible and practical to accomplish management purposes. Herbicide application for invasive species control, site preparation, precommercial thinning/release and midstory removal would not occur. These activities would be accomplished manually with chainsaws and/or other mechanical means. All other activities are the same as those proposed under the Proposed Action.

Technical Requirements

The technical requirements described below apply to the Proposed Action and the No Herbicide Alternative.

Cultural Resources

The following measures only apply to cultural resource sites that are unevaluated, eligible for listing, or listed in the National Register of Historic Places.

HP1: Site Avoidance During Project Implementation

Avoidance of historic properties (HP) will require the protection from effects resulting from the undertaking. Effects will be avoided by (1) establishing clearly defined site boundaries and buffers around archeological sites where activities occur that might result in an adverse effect. Buffers will be of sufficient size to ensure that integrity of the characteristics and values which contribute to, or potentially contribute to, the properties' significance will not be affected, and (2) routing proposed new roads, temporary roads, log landings and skid trails away from historic properties;

HP2: Site Protection During Prescribed Burns

(1) *Firelines.* Historic properties located along existing non-maintained woods roads used as firelines will be protected by hand-clearing those sections that cross the sites. Although these roads are generally cleared of combustible debris using a small dozer, those sections crossing archeological sites will be cleared using leaf blowers and/or leaf rakes. There will be neither removal of soil, nor disturbance below the ground surface, during fireline preparation. Historic properties and features located along proposed routes of mechanically-constructed firelines, where firelines do not now exist, will be avoided by routing fireline construction around historic properties. Sites that lie along previously constructed dozer lines from past burns where the firelines will be used again as firelines, will be protected during future burns by hand clearing sections of line that cross the site, rather than re-clearing using heavy equipment. Where these activities will take place outside stands not already surveyed, cultural resources surveys and regulatory consultation will be completed prior to project implementation. Protection measures, HP1, HP3, and HP4, will be applied prior to project implementation to protect historic properties.

(2) *Burn Unit Interior.* Combustible elements at historic properties in burn unit interiors will be protected from damage during burns by removing excessive fuels from the feature vicinity and, as necessary, by burning out around the feature prior to igniting the main burn, creating a fuel-free zone. Burn out is accomplished by constructing a set of two hand lines around the feature, approximately 30 to 50 feet apart, and then burning the area between the two lines while the burn is carefully monitored. Combustible features located in a burn unit will also be documented with digital photographs and/or field drawings prior to the burn. Historic properties containing above ground, non-combustible cultural features and exposed artifacts will be protected by removing fuel concentrations dense enough to significantly alter the characteristics of those cultural resources. No additional measures are proposed for any sites in the burn interior that have been previously burned or that do not contain combustible elements or other above ground features and exposed artifacts as proposed prescribed burns will not be sufficiently intense to cause adverse effects to these features.

(3) *Post-Burn Monitoring.* Post-burn monitoring may be conducted at selected sites to assess actual and indirect effects of the burns on the sites against the expected effects. State Historic Preservation Office (SHPO) consultation will be carried out with respect to necessary mitigation for any sites that suffer unexpected damage during the burn or from indirect effects following the burn.

HP3: Other Protection Measures

If it is not feasible or desirable to avoid an historic property that may be harmed by a project activity (HP1), then the following steps will be taken: (1) In consultation with the Arkansas SHPO, the site(s) will be evaluated against National Registry Historic Places (NRHP) significance criteria (36 CFR 60.4) to determine eligibility for the NRHP. The evaluation may require subsurface site testing; (2) In consultation with the Arkansas SHPO, tribes and nations, and with the Advisory Council of Historic Preservation (ACHP) if required, mitigation measures will be developed to minimize the adverse effects on the site, so that a finding of No Adverse Effect results; (3) The agreed-upon mitigation measures will be implemented prior to initiation of activities having the potential to affect the site.

HP4: Discovery of Cultural Resources during Project Implementation

Although cultural resources surveys were designed to locate all NRHP eligible archeological sites and components, these may go undetected for a variety of reasons. Should unrecorded cultural resources be discovered, activities that may be affecting that resource will halt immediately; the resource will be evaluated by an archaeologist, and consultation will be initiated with the SHPO, tribes and nations, and the ACHP, to determine appropriate actions for protecting the resource and mitigating adverse effects. Project activities at that locale will not resume until the resource is adequately protected and until agreed-upon mitigation measures are implemented with SHPO approval.

Soils

Allow heavy equipment operations on hydric soils, soils with a severe compaction hazard rating, and floodplains with frequent or occasional flooding hazard only during the months of July through November. Operations during December through June are allowed with the use of methods or equipment that do not cause excessive soil compaction. This standard does not apply to areas dedicated to intensive use, including but not restricted to administrative sites, roads, primary skid trails, log decks, campgrounds, and special use areas. (Revised Forest Plan, SW001, p. 74)

Allow heavy equipment operations on soils that have a high compaction hazard rating only during the months of April through November. Operations during December through March are allowed with the use of methods or equipment that do not cause excessive soil compaction. This standard does not apply to areas dedicated to intensive use, including but not restricted to administrative sites, roads, primary skid trails, log decks, campgrounds, and special use areas. (Revised Forest Plan, SW002, p. 74)

These standards apply to the stands displayed in the tables below *where operations would occur on* soil mapping units with a moderate-high, high and/or severe compaction hazard rating.

If the resulting timber sale payment units do not include any high risk soils, then limited operating seasons would not apply.

STANDS REQUIRING A LIMITED OPERATING SEASON SW001 (TABLE 2.1)

Compartment	Stand
1631	1
1631	13
1631	16
1631	17
1643	15
1643	35
1644	2
1644	3
1644	5
1644	7
1644	13
1644	20

Compartment	Stand
1644	21
1644	27
1644	29
1644	33
1644	39
1644	42
1644	44
1644	49
1644	50
1645	6
1645	14
1645	20

Compartment	Stand
1645	21
1645	26
1645	37
1645	41
1645	44
1655	1
1655	8
1655	16
1655	43
1655	44
1655	45

STANDS REQUIRING A LIMITED OPERATING SEASON SW002 (TABLE 2.2)

Compartment	Stand
1631	14
1631	15
1631	18

Compartment	Stand
1644	51
1645	29
1645	36

Compartment	Stand
1645	40

Soil loss from management actions will not exceed the estimated Forested T-factor for each soil or soil map unit, based on the cumulative time period between soil disturbing management actions. (Revised Forest Plan, SW003 (3), p. 74)

Scenery/Recreation

The following technical requirements are informed by the Southern Region's Scenery Treatment Guide (April, 2008) and the Fulton Branch Project Scenery Analysis (July, 2019).

- No proposed timber harvest activities would occur within a 100 foot buffer along both sides of the Womble trail.
- Keep to a minimum temporary road and skid trail crossings across designated forest trails. And crossings should be perpendicular to the designated forest trails. Avoid, as much as possible, using segments of designated forest trails as skid trails/haul roads. If such use is permitted, specify trail cleanup and rehabilitation at the end of the contract. Do not increase trail width.
- Retain, wherever possible, character trees and trees that define the trail corridor.
- Minimize changes to the trail alignment and surfacing; do not straighten the trail nor change its surface with an alternate material, unless such actions are needed to enhance the trail and protect resources.
- When activities are occurring along open trails, treat slash within 100 feet of the corridor, either daily or at another agreed upon time.

- If trails are temporarily closed due to harvesting, clear trail treads of all slash before reopening that section for public use. Treat slash to an average of 4 feet from the ground within 100 feet of the corridor before finalizing harvesting in the affected unit.
- Where prescribed harvest units contain a ridgeline, locate unit boundaries one tree-height below the ridgeline, especially where silhouetted against the sky. Moving the upper boundary below the ridge eliminates the "Mohawk" or thin timber the effect along ridges.
- Flowering and other visually attractive trees and understory shrubs are favored when leaving vegetation.
- For areas with a moderate to high Scenic Integrity Objective (SIO), leave tree marking or unit boundary is applied so as not to be visible within 100 feet of concern level 1 and 2 open roads.
- For areas with a moderate to high SIO, log landings, roads, and bladed skid trails should be located out of view, when possible, to avoid bare mineral soil being seen from concern level 1 and 2 open roads.
- The visual impact of roads and constructed firelines should be blended so they remain subordinate to the existing landscape character in size, form, line, color, and texture.
- Openings should be organically shaped. Edges should be shaped and/or feathered where appropriate to avoid a shadowing effect in the cut unit.
- Cut and fill slopes are re-vegetated to the extent possible.
- All harvest areas within a high SIO will be cut to an irregular shape and follow the landscape/contours.

Public Health and Safety

During prescribed burning activities, sign travel-ways as needed notifying the public there may be smoke along the road. Position flaggers or warning signs along the travel ways during active flaming. Inform the public of potential burn days, times, information contacts, and suggested alternatives for those concerned with smoke. Notify local, county and state law enforcement that burning will take place.

Monitoring

The Revised Forest Plan lists monitoring activities for the Ouachita National Forest. The Forest's monitoring program is designed to evaluate the environmental effects of actions similar to those proposed in this project and also serves to assess the effectiveness of treatments.

Trained contract administrators and inspectors will conduct routine on-site assessments throughout the implantation phases of the project, ensuring that the appropriate design criteria are followed to protect soil stability, water quality and other resources.

Activities that utilize herbicides will be monitored to ensure that all herbicides are used in accordance to label instructions. Form R8-FS-2100-1, Herbicide Treatment and Evaluation Record would be used to monitor all work involving herbicides. Stream samples would also be taken to monitor for offsite movement.

Other Past, Present and Reasonably Foreseeable Future Actions

Salvage operations and/or suppression of insect or disease outbreaks may be authorized under the following decisions: Program and Procedure for Salvage of Dead, Down, Damaged, or Hazard Trees (USDA, 2008); Implementation of Forest Insect and Disease Suppression Actions (USDA, Implementation of Forest Insect and Disease Suppression Actions, 2009).

Private land ownership – Private owners can be expected to continue their current land use practices (i.e. residential, agriculture, crystal mining).

Other past activities within the Fulton Branch Project area are evident in descriptions of the present conditions for each resource section analyzed in Chapter 3. Other ongoing activities are listed above in the description of the No Action Alternative.

Summary Comparison of Alternatives

COMPARISON OF ACTIONS BY ALTERNATIVE (TABLE 2.3)

Action (measure)	No Action	Proposed Action	No Herbicide
Seed tree regeneration harvest (acres)	0	304	304
Chemical site preparation (herbicides) (acres)	0	304	0
Mechanical/manual site preparation (no herbicides) (acres)	0	0	304
Prescribed burn site preparation (acres)	0	304	304
Hand plant shortleaf pine seedlings (acres)	0	304	304
Commercial thinning (acres)	0	1,042	1,042
Commercial thinning (plantation) (acres)	0	182	182
Commercial thinning (woodland development) (acres)	0	902	902
Timber stand improvement (precommercial thinning) (acres)	0	436	436
Wildlife opening maintenance (acres)	0	50	50
Pond maintenance (each)	0	25	25
Glade restoration (acres)	0	170	170
Nest boxes (each)	0	35	35
Fuel reduction/ecosystem prescribed burning (acres)	0	11,500	11,500
Fireline construction (miles)	0	7	7
Fireline reconstruction (miles)	0	27	27
System road reconstruction (miles)	0	12	12
Temporary road construction (miles)	0	14	14
System road decommission (miles)	0	7	7
Existing roads to add to National Forest System (miles)	0	2.3	2.3
Existing roads to open seasonally (October – February) (miles)	0	0.63	0.63
Trail relocation	0	0.5	0.5

Action (measure)	No Action	Proposed Action	No Herbicide
Watershed Improvement	0	Throughout	Throughout
Non-native invasive plant species control	0	Throughout	Throughout

COMPARISON OF ENVIRONMENTAL EFFECTS BY ALTERNATIVE (TABLE 2.4)

Environmental Effect (measure)	No Action	Proposed Action	No Herbicide
Additional Sediment Delivery by Watershed (tons/year)			
Cedar Creek – Ouachita River 80401010302	64.96	78.69	78.69
Little Fir Cemetery 80401010306	53.65	57.68	57.68
Ouachita River – Lake Ouachita 080401010305	62.23	818.86	818.86
Rainy Creek – Ouachita River 80401010303	27.5	257.46	257.46
Open Road Density (mile/square mile)			
MA 14	0.69	0.69	0.69
MA 16	0.25	0.25	0.25
MA 20	0.93	0.93	0.93
MA 21	0.15	0.15	0.15
Early Seral Habitat Created (acres)	0	1,382	1,382
Scenic Integrity Objectives Met	Yes	Yes	Yes
Below SW003 Allowable Soil Loss	Yes	Yes	Yes
Herbicide Hazard Quotients > 1	No	Yes	No

COMPARISON OF OBJECTIVES MET BY ALTERNATIVE (TABLE 2.5)

Objective (measure)	No Action	Proposed Action	No Herbicide
Improve the health and vigor of forest stands and improve stand quality (acres of timber stands treated resulting in reduced basal areas)	0	2,695	2,695
Contribute to the economic base of local communities by providing a sustained yield of high-quality wood products. (volume harvested – 100 cubic feet (ccf))	0	28,702	28,702
Provide grass-forb and seedling-sapling habitat conditions. (percent of suitable acres in early seral habitat)	0	15	15
Provide for a diversity of plant and animal communities; reduce fuel loads. (acres of prescribed burning)	0	11,500	11,500
Maintain or improve open habitats to provide high quality forage and nesting habitat for wildlife. (acres of wildlife openings maintained/created)	0	50	50
Eliminate non-native, invasive species.	0	throughout	throughout

Objective (measure)	**No Action**	**Proposed Action**	**No Herbicide**
(acres treated for invasive species eradication)			
Develop, operate, and maintain the road system to meet the requirements of the proposed actions, protect the environment, and provide reasonable and safe access. (miles of system road reconstruction; miles of temporary road construction)	0	12; 14	12; 14

Chapter 3
Affected Environment and Environmental Consequences

Air Quality

Present Conditions

The project area lies within lands designated as Class II with respect to the air resource. The Clean Air Act defines a Class II area as "a geographic area designated for a moderate degree of protection from future degradation of the air quality." A Class I Area is a geographic area designated for the most stringent degree of protection from future degradation of air quality. The closest Class I Area is the Caney Creek Wilderness Area, 24 miles southwest of the project area.

Existing emission sources occurring within the project area consist mainly of mobile sources. These would include, but are not limited to, combustion engines (such as those found in motor vehicles); dust from unpaved surfaces; smoke from local, county, agricultural, and forest burning; restaurants; and other activities. Of the six criteria air pollutants, all counties in the state are designated "attainment/unclassifiable" or "unclassifiable" (US Environmental Protection Agency, 2018).

No Action

Direct and Indirect Effects

The prescribed fire proposed in this project would not occur, therefore there would be no additional smoke generated from the proposed prescribed burning, and no degradation of air quality.

Cumulative Effects

No cumulative effects would occur because no prescribe burning would be conducted under the No Action Alternative; there would be no additive effect.

Proposed Action and No Herbicide

Direct and Indirect Effects

Occasional brief exposure of the general public to low concentrations of drift smoke is more a temporary inconvenience than a health problem. High smoke concentrations can, however, be a very serious matter. Human health effects related to particulate matter in smoke include: increased premature deaths; aggravation of respiratory system or cardiovascular illnesses; and changes in lung function, structure, and natural defense. Smoke also becomes a safety issue when it affects visibility on roadways. Smoke can also have a nuisance odor.
Smoke can have negative short-and long-term health effects. Fire management personnel exposed to high smoke concentrations often suffer eye and respiratory system irritation. Under some circumstances, continued exposure to high concentrations of carbon monoxide at the

combustion zone can result in impaired alertness and judgment. The probability of this happening on a prescribed fire is, however, virtually nonexistent because of limited exposure time.

Smoke is composed of hundreds of chemicals in gaseous, liquid and solid forms, some of which are toxins including carbon monoxide, particulate matter, acrolein and formaldehyde. Over 90 percent of the particulate emissions from prescribed fire are small enough to enter the human respiratory system. The repeated, lengthy exposure to relatively low smoke concentrations over many years can contribute to respiratory and cardiovascular problems.

Calculations of emissions from the proposed project were conducted to assess the increase in emissions loading in the project area. Consumption is assumed to be four tons per acre, with an average emission factor of 12 pounds of fine particulate matter per ton of fuel consumed. Calculations of emissions show that the resulting increase as a result of this project would be 34.54 from the largest prescribed burn unit.

All prescribed burning activities would be conducted in accordance with the Region 8 Smoke Management Guidelines in order to alleviate the smoke related impacts outlined above. Smoke management planning in accordance with the Guidelines has been successful in protecting health and safety during past activities. The Guidelines require that smoke dispersion modeling be conducted for most burn units to ensure that the smoke management objectives are met. If modeling shows potential impacts, adjustments or mitigations would be necessary in order to go forward with the burn. Each burn unit would be planned in accordance with the Guidelines such that specific parameters are met, including wind speeds and wind directions. While a few larger units would have the potential to transport smoke beyond the National Forest, potential impacts would be mitigated by burning with a wind direction away from the Forest boundary.

Based on existing air quality information, no long-term adverse impacts to air quality standards are expected from the proposed project. The proposed project is designed to ensure that the Guidelines are followed, and as such does not threaten to lead to a violation of any Federal, State or Local law or regulation related to air quality.

Cumulative Effects

The cumulative effects of prescribed burning on air quality consist of the downwind impact of multiple simultaneous prescribed burns, in addition to the other emissions in the area. These cumulative effects are rather short-lived. Once the burn is over and the smoke dissipates, the effect is over. Impacts to air quality would generally be confined to no more than a few hours or at most, 1-2 days. It is acknowledged that multiple simultaneous prescribed burns could cumulatively increase particulate levels. While it is difficult or nearly impossible to quantify such emissions in a planning analysis, voluntary compliance with the State of Arkansas Smoke Management Program insures compliance with applicable Federal and State regulations governing open burning.

Cultural & Historical Resources

Present Conditions

Former investigations have resulted in 1,430 acres of archaeologically surveyed areas and 37 documented sites. An additional 672 acres were surveyed for this proposed action, and 5 previously recorded sites were revisited to determine their significance. A Cultural Resources Report was prepared (Ouachita Cultural Resources Report 516) and submitted to the State Historic Preservation Office (SHPO), the Arkansas State Archeologist, and the federally recognized tribes interested in undertakings in Montgomery County: Caddo Tribe, Quapaw Nation, and Osage Nation.

Significant and undetermined sites will be protected from any proposed management activities. If any unknown heritage resources are discovered during stand treatments within the project areas, the District and Forest Archaeologists will be notified immediately. They will make an evaluation, in consultation with SHPO and the Tribal Historic Preservation Officers (THPOs), to determine appropriate action. Activity at that location will be suspended until that determination is complete.

Known Cultural Resources – 43 archeological sites have been identified in or near the Project Area as a result of cultural resources inventory surveys. Of the identified properties, 13 were determined significant and eligible for inclusion on the National Register of Historic Places (NHRP). Additionally, 6 archeological sites are of undetermined significance, but will be protected during project implementation.

Site Locations Not Yet Known - Cultural resource surveys may not be complete for certain activities because additional planning may be required prior to implementation. These activities include, but are not limited to:

- Burn boundary and fireline construction locations
- Temporary roads, skid trails, and log landings outside areas already surveyed
- Road construction, reconstruction, maintenance, conversion, or decommissioning activities involving ground disturbance occurring outside areas already surveyed
- New pond construction for wildlife water sources

These areas will be surveyed and regulatory and tribal consultation completed prior to implementation.

Effects Analysis

The scope of the analysis for potential effects to cultural resources includes the entire Fulton Branch Project area and considers the proposed activities within the treatment area (see Chapters 1 and 2), as well as access to these areas.

An effect to a cultural resource is the "…alteration to the characteristics of a historic property qualifying it for inclusion in or eligibility for the National Register." (36 CFR 800.16(i)) Any project implementation activity that has potential to disturb the ground has potential to directly affect archeological sites, as does the use of fire as a management tool. Specific activities that have potential to directly affect cultural resources include timber harvesting and associated log

landings, skid trails, and temporary roads, prescribed burning and associated fireline construction and road maintenance, construction or reconstruction where ground disturbance takes place outside existing right-of-way area.

Proposed activities that do not have potential to affect cultural resources, and therefore, are not considered undertakings for purposes of this project include: Non-commercial thinning, timber stand improvements, on-going maintenance of existing Forest roads or reconstruction of previously surveyed roads where ground disturbance does not take place outside existing road prisms and existing drainage features, rehabilitation/closure of temporary roads, log landings, and skid trails using non-ground disturbing methods, road decommissioning using non-ground disturbing methods, and non-native invasive plant species control using non-ground disturbing methods.

In general, proposed activities have the potential to affect cultural resources by encouraging increased visitor use to those areas of the Forest in which cultural resources are located. Increased visitor use of an area in which archeological sites are located can render the sites vulnerable to both intentional and unintentional damage. Intentional damage can occur through unauthorized digging in archeological sites and unauthorized collecting of artifacts from sites. Unintentional damage can result from such activities as driving motorized vehicles across archeological sites, as well as from other activities, principally related to dispersed recreation, that lead to ground disturbance. Effects may also include increased or decreased vegetation on protected sites due to increased light with canopy layer reduction outside of the protected buffer.

No Action

Direct, Indirect and Cumulative Effects

There would be no change in effects from the current condition, and the potential threat to integrity of cultural resources would remain unchanged.

Proposed Action and No Herbicide

Direct and Indirect Effects

Proposed access changes, soil restoration work and opening of forested areas from timber harvest can impact cultural resources. Surface artifacts or features may be exposed, disturbed or removed due to increased access and visibility.

Project components that have potential to directly affect archeological sites are primarily timber, prescribed fire, road management, and some wildlife management activities. Adverse effects to cultural resources resulting from proposed activities could be avoided provided site avoidance and site protection measures are properly applied to the known historic properties (see Chapter 2, technical requirements/design criteria). In that instance, project activities would not be expected to adversely affect archeological sites.

Cumulative Effects

There would be no additive effect from this project because there are no past, present or reasonably foreseeable future actions affecting cultural resources.

Soils

Present Condition

There are 45 soil mapping units within the project area. The majority of the project area, almost 2,919 acres, is comprised of Little fir-Bismarck complex soil mapping unit. The average slope range is 15 to 35%. This map unit consists of moderately deep to deep, and shallow, clayey and loamy soils on moderately sloping to steep hillsides. Management concerns include shallow depth and very low water holding capacity of Bismarck soils, a moderate erosion hazard, and a moderate compaction hazard. See project file for the soil mapping unit legend and soil map.

Prime Farmlands, Wetlands and Floodplains. Proposed management activities would not alter the soil's capacity to remain prime farmland. Soil mapping units identified as being in the 100-year flood plain or as being a hydric soil require special management considerations and evaluations so that proposed actions would not adversely alter the natural values of these areas. In this analysis area, there are no jurisdictional wetlands mapped. No soil map units depict hydric soil landforms in this analysis area. Soil map units 36, 54, 55, 60, 69, 101, 122, 128, 133 142, and 153 depict floodplain landforms in this analysis area. These map units represent a total of 1,181 acres of the project area. These mapped areas help to give an approximate determination of the 100-year boundary where their width is determined to be more than 200 feet. No structures are proposed within 100-year floodplains. For detailed information, reference E.O. 11988, E.O. 11990, FSM 2526 and FSM 2527.

No Action

Only the undisturbed natural erosion would be expected to continue. Natural erosion from undisturbed forest soils is very low, generally in the neighborhood of 0.01 to 0.15 tons/acre/year. There would be no management activities conducted on forest soils; no compaction would occur.

Proposed Action and No Herbicide

Erosion – Erosion is the detachment and transport of individual soil particles by wind, water, or gravity. Soils are considered detrimentally eroded when soil loss exceeds soil loss tolerance (Forested T-factor) values. Ground disturbing management practices influence erosion principally because they remove vegetative ground cover and often concentrate and channel runoff water. Forested T-factors and the soils susceptibility to erosion vary by soil and mapping unit. Soils with higher K-factor values and those soil map units with severe erosion hazard ratings require more intensive management efforts to reduce the potential for accelerated erosion both during and after the soil disturbing activity. Erosion can best be managed to stay within the Forested T-factor values by leaving sufficient amounts of the forest floor, slash and other onsite woody debris material which typically dominates an effective surface cover, not overly

compacting soils which would reduce water infiltration rates and result in increased overland flow rates, and not allowing water to concentrate and channel on roads, skid trails and landings.

The Revised Forest Plan Forest-wide design criteria identify maximum allowable soil loss thresholds (pp. 74-75). In order to determine whether the proposed actions meet these criteria, the Universal Soil Loss Equation (USLE) was used to calculate soil loss resulting from proposed treatments. For this analysis, worst case-modeling scenarios were analyzed for proposed management actions on soil map units with a severe erosion hazard potential.

The total calculated soil loss for the proposed management activities and the maximum allowable soil loss for three-year recovery period are displayed in the table below. These values are based on adequate implementation of erosion control treatment of log decks, temporary roads and primary skid trails (water bar and seed only).

MAXIMUM ALLOWABLE SOIL LOSS (TABLE 3.1)

Soil Map Unit	Compartment/ Stand	Treatment	Soil Loss (tons/acre)	
			Proposed Action & No Herbicide	Allowable
6	1644/44	Seed Tree/Site Preparation	9.95	12.25
8	1631/26	Seed Tree/Site Preparation	9.37	12.75

These worst-case scenarios meet the Forest criteria of staying within the allowable soil loss Forested T-factor. These treatment units, along with other proposed treatment units of less intense soil disturbing management actions, would remain within acceptable limits over the entire project area when erosion control measures are adequately implemented. Any stands requiring additional erosion control measures (mulching) would be listed in Chapter 2, technical requirements.

Compaction – Compaction increases soil bulk density and decreases porosity as a result of the application of forces such as weight and vibration. Compaction can detrimentally impact both soil productivity and watershed condition by causing increased overland flow during storm events and reduced plant growth due to a combination of factors including reduced amounts of water entering the soil and its reduced availability to plant growth, a restricted root zone, and reduced soil aeration. It is generally acknowledged that all soils are susceptible to soil compaction or a decrease in soil porosity. The soils in this planning area are most susceptible to compaction when wet.

Soil map hazard ratings for compaction are primarily due to low proportions of rock content in the top 6-inches of soil. This situation, when combined with heavy equipment operation on wet soils, can result in unacceptable levels of compaction. To ensure that compaction effects are kept within acceptable levels, additional mitigation would be implemented. On soils with a moderate-high or high compaction hazard rating, logging would be limited to the drier periods of the year, namely April through November. On soils with a severe compaction hazard rating, logging would be limited to a July through November operating season. Stands requiring limited operating seasons are listed in Chapter 2, technical requirements. Even during these drier periods, extra care would be taken to monitor soil conditions and suspend operations when soils become wet. Given this mitigation, soil compaction would be limited and is not expected to

impair soil productivity.

Fire – Any long-term negative effects to the soil would be related to high severity burns or very short frequency of the burns. Typical burn severity would be limited by established burning parameters and mitigation measures designed to protect soils and overstory trees and to minimize risk of escape. These parameters result in retention of enough leaf litter to protect soil from the negative effects listed above in most cases. Under-burn frequencies would be determined to allow recovery of forest floors and soil biota, and to not deplete soil nutrients.

Cumulative Effects

Effects from past actions are no longer impacting the soil resource. There are no present actions impacting the soil resource. There is always the potential for a wind or insect/disease event that would result in salvage or sanitation harvests within the same areas proposed for harvest under this project. Because salvage or sanitation harvests in response to these natural events would also follow the Revised Forest Plan guidance designed to protect the soil resource, any additive effect would be minimal.

Water Resources & Quality

Present Condition

The project area boundary encompasses 8,498 acres (37%) of Ouachita River – Lake Ouachita 12-digit hydrologic unit code (HUC) sixth-level subwatershed. The project area encompasses acreage from three other primary subwatersheds: 2,296 acres (12%) of Rainy Creek – Ouachita River, 258 acres (2%) of Little Fir Cemetery – Lake Ouachita, and 229 acres (1%) of Cedar Creek – Ouachita River.

The primary beneficial uses of waters within the project area are water sources for wildlife, amphibian spawning sites, native fisheries, and recreation. The project area is bound to the north by the Ouachita River, which is designated as an eligible Wild and Scenic River. The Ouachita River is designated an Ecologically Sensitive Water Body and Lake Ouachita is designated an Extraordinary Resource Water by the Arkansas Department of Environmental Quality (ADEQ, 2018).

Drainage patterns run south-north into the Ouachita River for most of the project area. There are no impaired surface waters (303(d) listing) within the project area. The Ouachita River, west of the project area, is listed for lead. Fiddlers Creek, northwest of the project area, is listed for dissolved oxygen and pH levels. South Fork Ouachita River, located south of the project area, is listed for dissolved oxygen. (ADEQ, 2018)

Effects Analysis

No Action

Direct and Indirect Effects

Although proposed soil disturbing activities resulting in stream sedimentation would not occur, watershed improvement activities would also not take place.

Proposed Action

Direct and Indirect Effects

Direct effects of management activities would result from logging equipment and vehicles traversing stream crossings, fireline and road construction through streams, etc. These activities could place pollutants directly into a watercourse. While it is impractical to eliminate all soil from entering a stream, it is possible to limit the amount that directly enters streams by designing and implementing BMPs found within the Revised Forest Plan and Arkansas Forester's BMPs. When herbicides are transported, mixed, and applied, there is a risk that the herbicide could be spilled. Herbicides may enter streams, ponds, and lakes during treatment by direct application or drift.

Indirect effects to water quality are those occurring at a later time or distance from the triggering management activity. Indirect effects are from management activities that do not have a direct connection to a stream course.

Timber harvest and fire can increase nutrients released to streams, with potentially positive or negative effects. Research studies in the Ouachita Mountains have shown increases in concentrations of some nutrients following timber harvest, but increases are generally small and short-lived, particularly where partial harvests are implemented (Oklahoma Cooperative Extension Service, 1994). Small increases in nutrient concentrations may have a beneficial effect on these typically nutrient-poor stream systems. Van Lear and others (1985) examined soil and nutrient export in ephemeral streamflow after three low-intensity prescribed fires prior to harvest in the Upper Piedmont of South Carolina. Minor increases in stormflow and sediment concentrations in the water were identified after low-intensity prescribed fires. It was suggested that erosion and sedimentation from plowed firelines accounted for the majority of sediment from all watersheds.

Road maintenance and/or construction, fireline construction and reconstruction and timber management activities such as construction of skid trails, temporary roads and log landings could result in increases in erosion and sedimentation. Roads contribute more sediment to streams than any other land management practice (Lugo & Gucinski, 2000).

Increases in water yield are generally proportional to decreases in vegetative cover. Because vegetative cover would to some extent decrease, water yield increases are expected to be minor (Oklahoma Cooperative Extension Service, 1994). Stream channels in the area are capable of withstanding small increases in flow.

Forest monitoring has demonstrated that indirect effects from vegetation manipulation from harvest or stand improvement with buffers did not have a significant effect on water quality (Clingenpeel, 1989). Beasley et al. (1987) showed a statistically significant increase in nutrient concentrations of orthophosphorus, potassium and calcium for only the first year after clearcutting. There was no effect from selection harvesting. Because of the short period of increases (one year) and the dilution of untreated areas, there was no meaningful impact to water quality.

The Proposed Action includes the use of the herbicides triclopyr, imazapyr, imazapic, glyphosate and picloram for site preparation, release and for the control of non-native invasive species. The control of non-native invasive terrestrial vegetation using herbicides within MA-9 would only be with an appropriately labeled formulation for both aquatic and terrestrial site use. When herbicides are applied, there is a risk that the chemical could move offsite, possibly entering streams, ponds, lakes, or infiltrate ground water by vertical seepage into aquifers. The Forest Service has specific regulations for the use and application of herbicides, and the Ouachita NF adheres to additional design criteria for herbicide application in the Revised Forest Plan. When all BMPs or regulations are implemented, there should be little movement of herbicide offsite. The introduction of herbicides into the water is treated as an indirect effect since standards and guidelines (BMPs) do not permit direct application for silvicultural purposes. Herbicide monitoring across the Forest has found that only trace amounts of herbicide have ever been detected in streams (Clingenpeel, 1993).

Herbicide applications were monitored for effectiveness in protecting water quality over a five-year period on the Ouachita NF (Clingenpeel, 1993). The objective was to determine if herbicides are present in water in high enough quantities to pose a threat to human health or aquatic organisms. From 1989 through 1993, 168 sites and 348 water samples were analyzed for the presence of herbicides. The application of triclopyr for site preparation and release was included in the analysis. Of those samples, 69 had detectable levels of herbicide. No concentrations were detected that would pose a meaningful threat to beneficial uses. Based on this evaluation, the BMPs used in the transportation, mixing, application and disposal are effective at protecting beneficial uses. Based on the results of these research and monitoring efforts and the mandatory implementation of BMP's an adverse direct or indirect effect resulting from these proposed management actions is unlikely.

No Herbicide Use

Direct and Indirect Effects

The effects of management activities would be the same as those described above except the listed effects from herbicide would not occur.

Cumulative Effects All Alternatives

The Aquatic Cumulative Effects (ACE) model was used to identify the watershed condition of the primary 12-digit Hydrological Unit Code (HUC) sixth-level subwatershed, as well as assess proposed project impacts. Watershed Condition Rank (WCR) is a measure integrated in the model that returns a High, Moderate, or Low risk level based on predicted sediment delivery to streams, and effects on fish community diversity and abundance. The primary variables driving ACE, and subsequently the WCR, are road density, urban areas, pasture lands and project treatments.

Local research has shown that the effects of increased sediment as a result of timber harvests are identifiable for up to 3 years (Beasley, Miller, & Lawson, 1987). The timeframe of this model is bound by three years prior and one year following implementation. This captures the effects of other management activities that may still affect the project area. This is consistent with most project level environmental analyses that have an operability of five years. Proposed actions are constrained to a single year. This expresses the maximum possible effect that could occur. Past activities that have a lasting effect (such as roads and changes in land use) are captured by modeling the sediment increase from an undisturbed condition. The predicted sediment delivery and risk level for the subwatershed is displayed in the table below.

SEDIMENT DELIVERY BY ALTERNATIVE (TABLE 3.2)

Subwatershed *12-digit HUC ID*	**Alternative**	**Sediment Delivery**		**Risk Level**
		Additional Tons Per Year	**% Increase***	
Rainy Creek – Ouachita River *80401010303*	*Current Condition*		848	Low
	No Action	27.5	855	Low
	Proposed Action & No Herbicide	257.46	909	Low
Ouachita River – Lake Ouachita *80401010305*	*Current Condition*		698	Low
	No Action	62.23	709	Low
	Proposed Action & No Herbicide	818.86	843	Low
Little Fir Cemetery – Lake Ouachita *80401010306*	*Current Condition*		416	Low
	No Action	53.65	437	Low
	Proposed Action & No Herbicide	57.68	439	Low
Cedar Creek-Ouachita River *080401010302*	*Current Condition*		1,793	High
	No Action	64.96	1,807	High
	Proposed Action & No Herbicide	78.69	1,810	High

*Percent increase over sediment delivery from undisturbed watershed condition

Rainy Creek – Ouachita River Subwatersheds

For all alternatives, the risk level to beneficial uses would remain low. There is no risk that effects would rise to a level threatening violation of any water quality standards or administrative limits. Effects are well understood, and mitigation in past projects has demonstrated effects are either not detectable or have no effect on beneficial uses.

Ouachita River – Lake Ouachita Subwatershed

For all alternatives, the risk level to beneficial uses would remain low. There is no risk that effects would rise to a level threatening violation of any water quality standards or administrative limits. Effects are well understood, and mitigation in past projects has demonstrated effects are either not detectable or have no effect on beneficial uses.

Little Fir Cemetery – Lake Ouachita Subwatershed

For all alternatives, the risk level to beneficial uses would remain low. There is no risk that effects would rise to a level threatening violation of any water quality standards or administrative limits. Effects are well understood, and mitigation in past projects has demonstrated effects are either not detectable or have no effect on beneficial uses.

Cedar Creek-Ouachita River Subwatershed

For all alternatives, the risk level to beneficial uses would remain high. Environmental effects would persist and could change the hydrologic system with observable changes for as long as the causing actions persist. Effects can threaten exceedance of environmental thresholds for periods of time (years). If causative actions persist over time, permanent adjustments can occur to the hydrologic system (USDA Forest Service, 2015).

The ACE Output Analysis Protocol states that if predicted sediment is less than a two percent increase over the current condition, then it is not considered to be a measurable change (USDA Forest Service, 2015). Sediment output is predicted to be 0.95%; therefore the Proposed Action or No Herbicide alternative would not result in a measurable change.

Transportation & Infrastructure

Present Conditions

Roads within the project area are used for a variety of purposes, including access to the Ouachita River, access to dispersed recreation, vehicle touring, and hunting access. Arkansas State Highway 298 bounds the project area to the west and Arkansas State Highway 27 crosses through the eastern portion of the project. County System Road 61, 59 and 197 provide access to the interior of the project area.

There are approximately 18 miles of National Forest System roads (NFSR) in the project area; about 12 miles are closed (administrative use). There are also 17 miles of highway and county roads; and 2 miles of Army Corps of Engineers roads. The current Motor Vehicle Use Map (MVUM) designates NFSRs as follows: 7 miles open to highway legal vehicles only, yearlong; 2 miles open to highway legal vehicles only, seasonally; 0 miles open to all vehicles, yearlong; 0 miles open to highway legal vehicles yearlong/OHVs seasonally; and 0 miles open seasonally to all vehicles.

Motorized mixed use occurs when a NFSR is designated for use by both highway-legal and non-highway-legal motor vehicles (FSM 7705). Motorized mixed use is allowed on 0 miles of roads within the project area. There are no designated motorized (OHV) trails.

For wildlife purposes, the Revised Forest Plan provides open road density (ORD) objectives by MA (OBJ05, p. 59). The following table displays calculated ORDs for the project and the objective for each MA.

OPEN ROAD DENSITY BY MA (TABLE 3.3)

Management Area	Open Road Density (mi/mi^2)	
	Objective	Project
14	1	0.69
16	0.75	0.25
20	1	0.93
21	0.75	0.15

Effects Analysis

No Action

Direct, Indirect and Cumulative Effects

No activities are proposed, therefore there would be no direct, indirect or cumulative effects to access or to ORD.

Proposed Action and No Herbicide

Direct and Indirect Effects

Seven miles of closed NFS road would be decommissioned. Temporary roads would be obliterated after management activities are completed. System road reconstruction would improve conditions sufficient to support management activities and restore routes to their original design function.

Changes to motor vehicle use route designations published on the MVUM would result from approximately 2.3 miles of road opened to public use yearlong and 0.63 miles seasonally (October – February).

There would be no change in ORD.

Cumulative Effects

There are no other past, present or reasonably foreseeable changes to the transportation system that would result in additional effects.

Vegetation

Present Conditions

The project area contains approximately 11,330 acres, of which, 8,838 acres are NFS lands; 8,755 acres are considered suitable (for timber production) lands. Some of the land in this project area has steep, rocky terrain. The land with these conditions is considered unsuitable. The project area includes Compartments 1631, 1643-1645, and 1655. Pine stands dominate the suitable lands in the project area:

- Pine forest = **3,968** acres.
- Pine hardwood forest = **3,637** acres.
- Hardwood pine forest = **15** acres.
- Hardwood forest = **1,134** acres.

Age classes range from 11 years old to 101+ years of age with the majority, 18%, falling into 71-80 years. 52% of the area is over 70 years of age, and there are currently 87 acres of 10 years or less. There are 2,453 acres of mature pine and pine/hardwood forest types (80+ years), while the mature hardwood and hardwood/pine types account for 476 acres (100+ years). The following table illustrates age class distributions on suitable lands only.

FOREST TYPE BY AGE CLASS SUITABLE LAND (TABLE 3.4)

Age Class		Forest Type (acres)				Total	
		Pine	Pine-Hardwood	Hardwood-Pine	Hardwood	Acres	Percent
0-10		42.22	0	0	45.12	87	1%
11−20		434.16	36.98	0	14.5	486	6%
21−30		286.57	0	11.1	141.67	439	5%
31−40		689.12	426.45	0	33.4	1149	13%
41−50		367.93	442.28	0	151.15	961	11%
51−60		101.47	43.67	0	74.05	219	3%
61−70		271.97	515.69	0	87.13	875	10%
71−80		511.38	982.53	0	115.25	1609	18%
81-90		576.71	448.43	0	72.18	1097	13%
91-100		545.36	314.12	3.77	353.3	1217	14%
101+		141.54	427.05	0	46.52	615	7%
Total	Acres	3968	3637	15	1134	8755	X
	%	45%	42%	0%	13%	X	100%

1 – Pine: At least 70% of the dominant and co-dominant crowns are softwoods.
Pine-Hardwood: 51-69% of the dominant and co-dominant crowns are softwoods.
Hardwood-Pine: 51-69% of the dominant and co-dominant crowns are hardwoods.
Hardwood: At least 70% of the dominant and co-dominant crowns are hardwoods.

Stands have an average basal area of about 110 square feet per acre.

Non-Native Invasive Species (NNIS) - An invasive species is identified as "[a] species that can move into an area and become dominant either numerically or in terms of cover, resource use, or other ecological impacts. An invasive species may be native or non-native" (USDA-Forest Service 2005a p. 132; USDA-Forest Service 2005b p. 172). Several non-native invasive plant species have been identified throughout the project area. These species include, but are not limited to: Chinese privet (*Ligustrum sinense*), tree of heaven (*Ailanthus altissima*), sericea lespedeza (*Lespedeza cuneate*), Japanese honeysuckle (*Lonicera japonica*), mimosa (*Albizia julibrissin*), autumn olive (*Elaeagnus umbellata*) and multiflora rose (*Rosa multiflora*).

No Action

Direct, Indirect and Cumulative Effects

There would be no direct effects on forest health and stand vigor. Proposed actions resulting in early seral habitat creation would not occur. In the absence of fire or other vegetation management activity, trees would grow in and grow up and shade out shrubs, forbs and grasses and reduce their quantities. In the absence of management activities such as thinning and regeneration harvests, forest health would be at risk due to increased potential for pest infestations such as the southern pine beetle. Over time, with no implementation of vegetation management, the amount of trees would increase, and forest health and stand vigor would continue to decline.

In the absence of natural disturbance, through time the current age classes would retain the same distribution in relation to one another, but the distribution would be increasingly skewed to the older age classes. The forest would continue to age, moving more pine and hardwood acreage into mature growth.

The lack of active NNIS control would allow plants to continue to produce seed and opportunistically spread throughout the area.

Proposed Action

Direct and Indirect Effects

The amount of early seral habitat within suitable acres would increase from 87 (1%) to approximately 1,206 acres (15%) through seed tree regeneration harvests and woodland development harvests. Dormant season, low intensity prescribed burning top-kills woody stems of three inches and less. This would hinder the in-growth of trees and maintain existing early seral habitat, along with wildlife opening maintenance.

Diseased, damaged and suppressed trees would be removed through commercial thinning (intermediate harvest) on approximately 1,042 acres of mature pine stands and 182 acres of pine plantations. By reducing stand densities through thinning, stand vigor would improve.

Existing mature growth pine habitat (80 years old or greater) would be reduced through even-aged regeneration harvests and woodland development from 28% to 13% of the acreage in pine and pine-hardwood stands. The percentage of mature growth hardwood habitat (100 years old or greater) would not change.

During the regeneration of pine stands, the hardwood sprout/seedling component objective is 10 to 30 percent of stems in hardwoods, primarily oaks and hickories (Revised Forest Plan, FR003, p. 80). Hardwoods would be removed in pine regeneration harvest areas through subsequent seedling release treatments, however a minimum of 10 percent hardwood would be retained or maintained through the life of the stand where possible. Recruitment of hardwoods within these stands could also be impeded by these activities.

NNIS would be reduced by treating identified populations across the project area with a combination of herbicide application and prescribed burning. Conversely, ground-disturbing activities such as timber harvest, road construction, road maintenance, fireline construction, fireline maintenance, and wildlife opening construction could increase the population and spread of non-native invasive species by destroying individual stems which would result in prolific sprouting. They would also provide seedbeds for NNIS germination. Mechanical equipment could also dislodge seeds and transport them to unaffected areas. Implementation of Best Management Practices would reduce the possibility of introducing or spreading non-native invasive plants during project implementation.

Cumulative Effects

There are no other past, present, and reasonably foreseen future actions.

No Herbicide Use

The effects of this alternative would be the same as those listed under the Proposed Action except only manual or mechanical methods would be used in vegetation management activities. NNIS control would be more difficult, increasing the likelihood of continued spread. Site preparation and release activities would be less successful, making stand establishment more difficult.

Effects on Migratory Bird Species

The pileated woodpecker, scarlet tanager, and prairie warbler are representative migratory bird species within the project area and are some of the 1,026 species listed under the Migratory Bird Treaty Act. Effects on these species and their habitat are disclosed in the following Management Indicator Species (MIS) and Proposed, Endangered, Threatened, and Sensitive (PETS) species sections.

Management Indicator Species and Habitat (MIS)

As part of the overall effort to ensure that habitat requirements of all native vertebrates, invertebrates, and plants are considered in the planning, implementation, and monitoring of

Forest management practices, the Revised Forest Plan lists 24 species that should adequately address the effects of Forest management practices on fish and wildlife populations and their habitat needs, as well as demand species and species of special interest. These 24 species, termed "Management Indicator Species" (MIS), represent a broad array of habitats covering diverse geographic areas within the ONF, as well as inhabiting areas with diverse management objectives.

MIS Selected for This Project: The entire list of 24 MIS was reviewed and a subset was selected as MIS for the actions proposed in this EA. The MIS selected include 6 terrestrial species and 9 fish species. Species not known to occur within the action area, lacking suitable habitat, or not tied to an appropriate evaluation objective were not selected, as indicated in the far right column of the following table.

POTENTIALLY AFFECTED MANAGEMENT INDICATOR SPECIES (TABLE 3.4)

Life Form	Common Name	Scientific Name	Selected?
Mammal	White-tailed deer	*Odocoileus virginianus*	**Yes**
Bird	Northern Bobwhite	*Colinus virginianus*	**Yes**
Bird	Eastern Wild Turkey	*Meleagris gallapavo*	**Yes**
Bird	Red-cockaded Woodpecker	*Picoides borealis*	No
Bird	Pileated woodpecker	*Dryocopus pileatus*	**Yes**
Bird	Scarlet Tanager	*Piranga olivacea*	**Yes**
Bird	Prairie Warbler	*Dendroica discolor*	**Yes**
Fish	Largemouth bass	*Micropterus salmoides*	No
Fish	Smallmouth bass	*Micropterus dolomieu*	**Yes**
Fish	Bluegill sunfish	*Lepomis macrochirus*	No
Fish	Redear sunfish	*Lepomis microlophus*	No
Fish	Yellow bullhead	*Ameiurus natalis*	**Yes**
Fish	Highland stoneroller	*Campostoma spadiceum*	**Yes**
Fish	Redfin darter	*Etheostoma whipplei*	No
Fish	Green sunfish	*Lepomis cyanellus*	**Yes**
Fish	Longear sunfish	*Lepomis megalotis*	**Yes**
Fish	Johnny darter	*Etheostoma nigrum*	No
Fish	Orangebelly darter	*Etheostoma radiosum*	**Yes**
Fish	Channel darter	*Percina copelandi*	No
Fish	Pirate perch	*Aphredoderus sayanus*	No
Fish	Creek chubsucker	*Erimyzon oblongus*	No
Fish	Northern Studfish	*Fundulus catenatus*	**Yes**
Fish	Northern hog sucker	*Hypentilium nigricans*	**Yes**
Fish	Striped shiner	*Luxilus chrysocephalus*	**Yes**

Terrestrial MIS

TERRESTRIAL MIS AND ASSOCIATED PURPOSES (TABLE 3.5)

Life Form	Scientific Name	Common Name	Primary Reason for Selection
Bird	*Colinus virginianus*	Northern Bobwhite	To help indicate effects of management on meeting public hunting demand, and to help indicate effects of

			management on the pine-oak woodland community
Bird	*Dendroica discolor*	Prairie Warbler	To help indicate effects of management on the early successional component of forest communities
Bird	*Meleagris gallopavo*	Eastern Wild Turkey	To help indicate effects of management on meeting public hunting demand
Mammal	*Odocoileus virginianus*	White-tailed deer	To help indicate effects of management on meeting public hunting demand
Bird	*Dryocopus pileatus*	Pileated Woodpecker	To help indicate effects of management on snags and snag-dependent species
Bird	*Piranga olivacea*	Scarlet Tanager	To help indicate effects of management on mature forest communities

Terrestrial MIS Forest-wide Trends

The 6 selected terrestrial MIS were modeled using the CompPATS wildlife model to compare predicted future habitat capabilities over the next decade (2022-2032) for each of the 3 alternatives evaluated in the project area. Projected numbers of terrestrial MIS per square mile were compared against the current "pre-existing habitat condition" which serves as the baseline for the proposed activities.

TERRESTRIAL MIS RESPONSE BY ALTERNATIVE (TABLE 3.6)

Alternative *Year**	**Management Indicator Species**					
	White-tailed Deer	**Pileated Woodpecker**	**Eastern Wild Turkey**	**Northern Bobwhite**	**Scarlet Tanager**	**Prairie Warbler**
	Individuals Per Square Mile					
Baseline	**15**	**27**	**6**	**21**	**27**	**12**
No Action						
Project 1st year	15	27	6	21	27	12
Project at 10 years	**14**	**30**	**7**	**16**	**28**	**2**
Forest-wide trend	-	+	+	-	+	-
Proposed Action & Alternative C – No Herbicide						
Project 1st year	**28**	**15**	**8**	**77**	**24**	**93**
Project at 10 years	15	28	5	23	28	12
Forest-wide trend	+	-	+	+	-	+

<u>Northern Bobwhite</u> (*Colinus virginianus*)

Northern Bobwhites require a diverse, habitat that includes open areas of herbaceous vegetation for foraging, grassy areas for nesting, heavy brush or woody cover, and bare ground with little litter cover (Rosene, 1984) (Roseberry & Sudkamp, 1998) (Brennan, 1999). They also readily use early pine and pine-hardwood forest conditions for foraging, hiding, nesting, and rearing young (Brennan, 1999). Bobwhites are usually associated with early successional plant communities, and their abundant herbaceous plants, seed crops, fruits, and insect prey items are vital to their life history (Dimmick, Gudlin, McKenzie, & Wells, 2004).

This species has experienced population declines across Arkansas due to decreases in early seral stage habitat, loss of agricultural lands, and changes in agricultural practices. In the 2005 RLRMP, the population objective for the Northern Bobwhite is an average of 36.6 birds per

square mile (USDA Forest Service 2005b). Bobwhite call counts and Breeding Bird Survey data indicate a slight increase for the Ouachita National Forest.

The Northern Bobwhite population viability on the Ouachita National Forest is not expected to be threatened and populations are expected to improve through 2005 RLRMP implementation. The Ouachita National Forest has pursued aggressive prescribed fire and thinning programs that are providing habitat improvements, especially associated with some 200,000 acres of shortleaf pine-bluestem grass ecosystem restoration. It is expected that these management actions will soon positively act to overcome the downward trends.

Direct and Indirect Effects

No Action

This alternative would have no direct effect on this species. Indirectly it would have a negative effect on the forest-wide population trend for this species due to lack of creation of foraging and nesting opportunities. No action would mean that no new open area would be created for these species resulting in no creation of early-seral habitats as overstory vegetation becomes established and shades out sub-canopy competition. Natural recruitment of early seral communities would also be limited in that suppression of wildfires and timber insect infestation would still occur.

Proposed Action

This alternative would have an overall positive effect on the Forest-wide trend for this species due to the creation and maintenance of early successional habitat needed by quail. Prescribed fire, herbicide applications, heavy equipment operation and associated soil disturbances, and forest thinnings would all promote and help maintain a mosaic of open forest stands with patches of early successional habitat. Overall, the proposed management activities under this alternative would ensure more quality long-term habitat for this species. With sustained habitat improvements, the quail population may slow its current decreasing trend and possibly increase in this ecosystem.

Timber Management *(regeneration harvest (seed-tree, clearcut for shortleaf restoration) thinnings (precommercial, commercial, woodland), mechanical site preparation, chop/rip/hand plant shortleaf pine seedlings, mechanical timber stand improvement, midstory reduction)*

All proposed timber management activities will create several areas of early seral stage habitat and would open up the canopy, allowing sunlight to penetrate the forest floor, thus increasing the early seral vegetation which is essential to bobwhites. Overall, the proposed actions would create a variety of habitats (foraging, nesting, brooding, escape cover, etc) within the ranges of this species. Habitat benefits derived from the various harvest treatments would depend directly on the size and type of harvest. Many treatments, like seed tree and clearcut restoration, would provide more long term habitat benefits due to their size and varying landscape attributes.
No direct effects should occur to adults since they are highly mobile. However, existing nests with eggs could be damaged and/or destroyed if timber activities occur during the nesting

season. Re-nesting would also likely occur in most situations of disturbance thus offsetting overall losses in brood production.

Chemical Treatments *(chemical site preparation, chemical timber stand improvement and non-native invasive plant species control)*

Direct contact with herbicides (or feeding on insects and vegetation that have been exposed to herbicides) could potentially harm quail, however, glyphosate, imazapic, imazapyr, picloram and triclopyr are considered relatively non-toxic to birds when applied according to registered label directions. Based on these toxicity ratings, these herbicides should not have any substantial direct effects on quail. Potential exposure to herbicides from proposed treatments would likely fall below risk factors (LD_{50} and LC_{50} values) established in the risk assessments for birds. Given that adults are highly mobile and application most likely would occur outside the nesting season, it is improbable that there would be any direct effects to quails. Indirectly, herbicide applications could help maintain early successional habitat. Reduction of non-native invasive species would also improve the native plant populations which could increase insect populations in the area. The following table lists the toxicity ratings to bird species for each herbicide proposed for use.

SUMMARY OF LD_{50} VALUES FOR BIRD SPECIES (TABLE 3.7)

Active Ingredient	LD_{50}*	Toxicity Risk to Bobwhite and or Mallard	Risk Assessment
Glyphosate	>5000mg/kg bw	Relatively non toxic	Syracuse Environmental Research Associates, Inc. 2011a
Imazapic	>5000 mg/kg bw	Relatively non toxic	Syracuse Environmental Research Associates, Inc. 2004d
Imazapyr	>5000 mg/kg bw	Relatively non toxic	Syracuse Environmental Research Associates, Inc. 2011b
Picloram	>4012 mg a.e./kg	Relatively non toxic	Syracuse Environmental Research Associates, Inc. 2011c
Triclopyr	>1000 mg/kg bw	Relatively non toxic	Syracuse Environmental Research Associates, Inc. 2011d

LD_{50}*: lethal dose for 50% of population tested

Prescribed Burning *(fire restoration treatments and fuel reduction)*

Prescribed burns would occur over the majority of the project area sometime during the 10 years following implementation of the proposed actions and would occur in both growing and dormant seasons. Direct effects to bobwhites are unlikely since these species are highly mobile and would be able to avoid burns. There is the potential for nests to be lost if burns occur during nesting season, however, the chance of this occurring is small as this time of the year would only include small burns occurring predominantly in fully stocked wooded stands that are not preferred nesting habitat. Indirect effects of prescribed burning would be to consume woody debris which would encourage growth of shrubs and herbaceous plants essential for foraging and nesting.

Road/Fireline Construction, Reconstruction, Decommission and Maintenance; Trail Relocation Treatments

Eggs and nest may be destroyed or abandon by adults when roads, firelines and trails are constructed during nesting season. Bobwhites may be displaced during construction and periods of high activity, such as timber removal. After the roads and firelines have been closed and rehabbed, the effects would provide additional early seral habitat, resulting in an indirect increase in nesting and foraging habitat as well as travel corridors.

Pond Improvements

No direct effects are anticipated for pond improvements. Indirectly pond improvements would serve as important water sources and foraging area.

Wildlife Opening Improvement

Nests may be directly affected if activities are conducted during nesting season. Indirectly, wildlife opening improvement would increase and enhance the amount of available early seral habitat for these species within the watershed and provide areas of high nutrient forage as well as nesting habitat.

Glade Restoration

Direct and indirect effects would be the same as timber and prescribed burning treatments.

Watershed Restoration

Watershed restoration activities would be used to protect wildlife, soil and water resources. No direct impacts to bobwhites are anticipated since actions would be close to currently open and closed roads/trails; reassign designation of existing roads and rehabilitate impacted areas. Indirect effects would be beneficial since the proposed activities would provide linear flight and travel corridors and allow these areas to revegetate thus providing potential foraging habitat.

Nest Boxes Installation

Nest box installation should have no direct or indirect effects on this ground-nesting terrestrial species.

No Herbicide Use

The effects of this alternative would be the same as the proposed action except the effects attributed to herbicide application would not occur.

Cumulative Effects

There are no past, present, or reasonably foreseeable future actions that would be additive to the effects of this project. Cumulatively, the No Action Alternative would be negative for this species as a continuous population decline due to loss of habitat would occur. The Proposed Action, including the herbicide treatment, would have beneficial effects on populations until the early seral habitat reaches canopy closure in approximately 10 years.

Prairie Warbler (*Dendroica discolor)*

As a Neotropical migrant, Prairie Warbler uses early successional habitats such as regeneration old fields, pastures, and young forest stands. The vegetation selected may be deciduous, conifer, or mixed types. Habitats with scattered saplings, scrubby thickets, cutover or burned over woods, woodland margins, open brushy lands, mixed pine and hardwood, and scrub oak woodlands are most often selected.

Breeding Bird Survey data indicates a 3.0% decline from 1966-2012 (Sauer, et al., 2014). Further, warbler populations have been declining on the Ouachita National Forest over the past ten years (USDA Forest Service, 2011). The 2011 Monitoring Report states, "Throughout the Prairie Warbler range, a downward trend is indicated." this decline is considered directly related to the reduction in acres of early forest stage cover habitat in pine forest types.

Direct and Indirect Effects

No Action

This alternative would perpetuate conditions that could keep prairie warbler populations on a downward trend, possibly even jeopardizing the viability of this species within this ecosystem. This loss in numbers of prairie warblers is being observed Forest-wide. This alternative would likely have a negative impact on the Forest population trend for this species.

Proposed Action

This alternative should have a positive effect on the Forest population trend for this species due to the creation and maintenance of early successional habitat needed by this warbler, which is presently very low in this ecosystem. Prescribed fire, herbicide applications, heavy equipment operation and associated soil disturbances, and forest thinnings would all promote and help maintain a mosaic of open forest stands with patches of early successional habitat. Overall, the proposed management activities under this alternative would ensure more quality long-term habitat for this species. With sustained habitat improvements, the prairie warbler population should increase.

Timber Management *(regeneration harvest (seed-tree, clearcut for shortleaf restoration) thinnings (precommercial, commercial, woodland), mechanical site preparation, chop/rip/hand plant shortleaf pine seedlings, mechanical timber stand improvement, and midstory reduction)*

All proposed timber management activities will create several areas of early seral stage habitat and would open up the canopy, allowing sunlight to penetrate the forest floor, thus increasing the early seral vegetation which is essential to warblers. Overall the proposed actions would create a variety of habitats (foraging, nesting, etc) within the ranges of this species. Habitat benefits derived from the various harvest treatments would depend directly on the size and type of harvest. Many treatments like seed tree and clearcut restoration would provide more long term habitat benefits due to their size and varying landscape attributes.

No direct effects should occur to adults since they are highly mobile. However, existing nests with eggs could be damaged and/or destroyed if timber activities occur during the nesting season. Re-nesting would also likely occur in most situations of disturbance thus offsetting overall losses in brood production. Indirectly, the activities would be beneficial through the creation of preferred nesting and foraging habitat.

Chemical Treatments *(chemical site preparation, chemical timber stand improvement and non-native invasive plant species control)*

Direct contact with herbicides (or feeding on insects and vegetation that have been exposed to herbicides) could potentially harm warblers. However, glyphosate, imazapic, imazapyr, picloram and triclopyr are considered relatively non-toxic to birds when applied according to registered label directions. Based on these toxicity ratings, these herbicides should not have any substantial direct effects on warblers. Potential exposure to herbicides from proposed treatments would likely fall below risk factors (LD_{50} and LC_{50} values) established in the risk assessments for birds. Given that adults are highly mobile and application most likely would occur outside the nesting season, it is improbable that there would be any direct effects to warblers. Herbicide applications would have a positive indirect effect by helping to maintain early successional habitat. Reduction of non-native invasive species would also improve the native plant populations which could increase insect populations in the area. See Table 3.7 (above) for a list of toxicity ratings to bird species for each herbicide proposed for use.

Prescribed Burning *(fire restoration treatments and fuel reduction)*

Prescribed burns would occur over the majority of the project area sometime during the 10 years following implementation of the proposed actions and would occur in both growing and dormant seasons. Direct effects to warblers are unlikely since these species are highly mobile and would be able to avoid burns. There is the potential for nest to be lost if burns occur during nesting season. This potential is negligible as the primary prescribed burn season is outside of this species nesting season. Indirect effects of prescribed burning would be to consume woody debris which would encourage growth of shrubs and herbaceous plants essential for foraging and nesting.

Road/Fireline Construction, Reconstruction, Decommission and Maintenance; Trail Relocation Treatments

Direct effects may include the destruction of eggs and nests or nest abandonment by adults when roads, firelines or trails are constructed during nesting season. Warblers may be displaced during construction and periods of high activity, such as timber removal. After the roads and firelines

have been closed and rehabbed, the indirect effects would provide additional early seral habitat, resulting in an increase in nesting and foraging habitat.

Pond Improvements

No direct effects are anticipated for pond improvements. Indirectly, pond improvements would serve as important water sources and foraging areas.

Wildlife Opening Improvement

Nests may be directly affected if activities are conducted during nesting season. Indirectly, wildlife opening improvement would increase and enhance the amount of available quality early seral habitat for this species within the watershed and provide areas of high nutrient forage habitat.

Glade Restoration

Direct and indirect effects would be the same as timber and prescribed burning treatments.

Watershed Restoration

Watershed restoration activities would be used to protect wildlife, soil and water resources. No direct impacts to prairie warblers are anticipated since actions would be close to currently open and closed roads/trails; reassign designation of existing roads and rehabilitate impacted areas. Indirect effects would be beneficial since the proposed activities would provide linear flight and travel corridors and allow these areas to re-vegetate thus providing potential foraging habitat.

Nest Boxes Installation

No direct or indirect impacts are anticipated as a result of placing nest boxes in project area. Placement would require minimal ground disturbance and would not result in a significant loss of habitat.

No Herbicide Use

The effects of this alternative would be the same as the proposed action except the effects attributed to herbicide applications would not occur.

Cumulative Effects

There are no past, present, or reasonably foreseeable future actions that would be additive to the effects of this project. Cumulatively, the No Action Alternative would be negative for this species as a continuous population decline due to loss of habitat would occur. The Proposed Action, including the herbicide treatment, would have beneficial effects on populations until the early seral habitat reaches canopy closure in approximately 10 years.

Eastern Wild Turkey (*Meleagris gallapavo)*

This species is a highly prized game animal that uses a wide range of habitat types with habitat diversity needs that include grass and forb openings (seeds, fruits, berries and insects) interspersed with older timber stands capable of producing hard and soft mast.

Turkey harvest, poult production and Landbird point survey data indicates a downward trend. These data would appear to indicate a reduction in the number of turkey while habitat capability modeling indicates a positive trend and remains above the level projected in the RLRMP. The sustained high levels for habitat capability would indicate that the drop in harvest levels, reductions in poults per hen, and birds detected on the Landbird points are due to factors other than habitat. Research across the South has shown that prescribed fire treatment including growing season burn, improve turkey habitat by opening up dense forest, reducing shrub and brush, and improving nesting and brood rearing habitat (Cox, 2008). In addition, areas that were not burned for more than two years were almost devoid of turkey hens.

Direct and Indirect Effects

No Action

Under this alternative, the current habitat capability for turkeys would remain at levels just above the minimum projected levels in the Revised Forest Plan. However, the turkey population is not currently facing any viability issues and this alternative should have no effect on the Forest-wide population trend for this species.

Proposed Action

This alternative should have a positive effect on the Forest population trend for this species due to the creation and maintenance of early successional areas needed as a critical habitat component by turkeys. Prescribed fire, herbicide applications, heavy equipment operation and associated soil disturbances, and forest thinnings would all promote and help maintain a mosaic of open forest stands with blocks of early successional habitat. Overall, the proposed management activities under this alternative would ensure more quality long-term habitat for this species, specifically, a mixture of early successional habitat needed for nesting and poult rearing, as well as the mature forests needed for roosting and hard mast forage production. With sustained forest health and habitat diversity, the turkey population should remain stable or increase with this alternative.

Timber Management *(regeneration harvest (seed-tree, clearcut for shortleaf restoration) thinnings (precommercial, commercial, woodland), mechanical site preparation, chop/rip/hand plant shortleaf pine seedlings, mechanical timber stand improvement and midstory reduction)*

All proposed timber management activities will create several areas of early seral stage habitat and would open up the canopy, allowing sunlight to penetrate the forest floor, thus increasing the early seral vegetation. Overall the proposed actions would create a variety of habitats (foraging, nesting, brooding, escape cover, etc) within the ranges of this species. Habitat benefits derived

from the various harvest treatments would depend directly on the size and type of harvest. Many treatments like seed tree and clearcut would provide more long term habitat benefits due to their size and varying landscape attributes.

Direct effects to mature turkey are unlikely since these species are highly mobile and would be able to avoid these activities. However, existing nest, eggs and young poults could be damaged or destroyed. Turkeys may be temporarily displaced during timber management activities and nest may be abandon.

Chemical Treatments *(chemical site preparation, chemical timber stand improvement and non-native invasive plant species control)*

Direct contact with herbicides (or feeding on insects and vegetation that have been exposed to herbicides) could potentially harm turkeys. However, glyphosate, imazapic, imazapyr, picloram and triclopyr are considered relatively non-toxic to birds when applied according to registered label directions. Based on these toxicity ratings, these herbicides should not have any substantial direct effects on turkey. Potential exposure to herbicides from proposed treatments would likely fall below risk factors (LD_{50} and LC_{50} values) established in the risk assessments for birds. Given that adults are highly mobile and application most likely would occur outside the nesting season, it is improbable that there would be any direct effects to turkeys. Herbicide applications could help maintain early successional habitat. Reduction of non-native invasive species would also improve the native plant populations which could increase insect populations in the area. Overall, any negative direct effects would be far outweighed by the beneficial indirect effects of this alternative. Table 3.7 (above) lists the toxicity ratings to bird species for each herbicide proposed for use.

Prescribed Burning *(fire restoration treatments and fuel reduction)*

Direct effects of dormant and growing season burns on this bird are likely minimal because adults are highly mobile and poults are precocial and able to follow the hen within one to two days of hatching. Nesting, eggs, and non-mobile hatchlings may be destroyed by growing season burns, but the benefits of improved habitat outweigh the nests lost, and in many cases.

Indirect effect of prescribed burning would be to consume woody debris allowing early forest stage growth and provide this demand species easier access to forage. Burning would also encourage growth of herbaceous browse which is essential for growth and development of this species.

Road/Fireline Construction, Reconstruction, Decommission and Maintenance; Trail Relocation Treatments

Eggs and nest may be destroyed or abandoned by adults when roads, firelines or trails are constructed during nesting season. Turkeys may be displaced during construction and periods of high activity, such as timber removal. After the roads and firelines have been closed and rehabbed, the effects would provide additional early seral habitat, resulting in an increase in nesting and foraging habitat.

Pond Improvements

No direct effects are anticipated for pond improvements. Indirectly pond improvements would serve as important water sources and foraging area.

Wildlife Opening Improvement

Wildlife opening improvement would increase and enhance the amount of available early seral habitat for these species within the watershed and provide areas of high nutrient forage habitat.

Glade Restoration

Direct and indirect effects would be the same as timber and prescribed burning treatments.

Watershed Restoration

Watershed restoration activities would be used to protect wildlife, soil and water resources. No direct impacts to turkey are anticipated since actions would be close to currently open and closed roads/trails; reassign designation of existing roads and rehabilitate impacted areas. Indirect effects would be beneficial since the proposed activities would provide linear flight and travel corridors and allow these areas to re-vegetate thus providing potential foraging habitat.

Nest Boxes Installation

Nest box installation should have no direct or indirect effects on this ground-nesting terrestrial species.

No Herbicide Use

The effects of this alternative would be the same as the proposed action except the effects attributed to herbicide application would not occur.

Cumulative Effects

There are no past, present, or reasonably foreseeable future actions that would be additive to the effects of this project.

White-tailed Deer *(Odocoileus virginianus)*

White-tailed deer has a diet that includes annual and perennial forbs, fruits, hard mast, grasses, flowers and fungi. Food utilization studies of deer in the southern U.S. show that use of woody twigs, even in winter, is insignificant (Miller, 2001). The quality and quantity of forage have the greatest impacts on deer populations.

The estimated habitat capability for deer for fiscal years 2006-2011 show a downward trend; yet it still exceeds the desired habitat capability of 48,250 acres for FY 2016. Habitat carrying capacity is calculated using acres within the Ouachita National Forest and is influenced by the

amount of prescribed fire and early seral habitat created, including regeneration, thinning, timber stand improvement, mid-story removal, wildlife openings, and site preparation (USDA Forest Service, 2011).

For deer, the habitat capability model places a greater value on early seral stage habitat and gives lesser value to habitat created by thinning and prescribed fire. In contrast to the declines in even-age regeneration cutting, the acres of thinning and prescribed fire have increased.

Direct and Indirect Effects

No Action

The amount of early successional habitat needed by deer in this area would remain absent unless created through random natural disasters. However, the deer population is not currently facing any viability issues, and this alternative should have minimal impacts on the forest population trend for this species.

Proposed Action

This alternative would be beneficial due to the creation and maintenance of early successional areas needed as a critical habitat component by deer. Prescribed fire, herbicide applications, heavy equipment operation and associated soil disturbances, and forest thinning would all promote and help maintain a mosaic of open forest stands with patches of early successional habitat. Sedimentation and creation of wildlife nesting habitat would not have any substantial cumulative effects on deer. Overall, the proposed management activities under this alternative would ensure more quality long-term habitat for this species, specifically, a mixture of early successional habitat needed for cover and browsing, as well as the mature mast producing hardwoods needed for fall and winter foraging. With sustained forest health and habitat diversity, the deer population should remain stable or increase with this alternative. This alternative should have a positive effect on the Forest population trend for this species.

Timber Management *(regeneration harvest (seed-tree, clearcut for shortleaf restoration) thinnings (precommercial, commercial, woodland), mechanical site preparation, chop/rip/hand plant shortleaf pine seedlings, mechanical timber stand improvement and midstory reduction)*

After timber management activities are completed and it is followed up by fire and silvicultural treatments, the persistence of the early seral habitat conditions would be extended. The reduction in the density of trees and associated shade would result in improved habitat conditions for forest floor food and cover plants benefitting deer. The response of herbaceous forage species to harvest, in declining order by method, would be clearcut, permanent openings, seed tree and then thinnings. A good mix of these harvest methods would provide excellent deer habitat (Yarrow & Yarrow, 2005). Although it is possible for juvenile deer to be killed during these activities if performed shortly after fawning season, direct effects on this species would be negligible due to their ability to mobile within a few weeks post fawning. Indirectly, these activities would be beneficial for this species and increase carrying capacity and foraging opportunities and quality.

***Chemical Treatments** (chemical site preparation, chemical timber stand improvement and non-native invasive plant species control)*

Direct contact with herbicides (or feeding on vegetation that has been exposed to herbicides) could potentially harm deer. This species may be displaced during application of herbicide, but his will be for a relatively short period of time in any treatment area. The indirect effects of the application of herbicides will lengthen the duration of early seral habitat where applied, thus maintaining appropriate habitat patches for deer.

***Prescribed Burning** (fire restoration treatments and fuel reduction)*

There should be no direct effects to this species as deer are highly mobile at this time. Indirectly, prescribed fire would increase browse, forbs, grass and legume production and overall nutrition. Fire also plays an important role in the development and maintenance of oak forests that provide important winter deer foods.

Road/Fireline Construction, Reconstruction, Decommission and Maintenance; Trail Relocation Treatments

Closed roads and fireline corridors provide additional edge habitat, travel ways, escapes routes and potential foraging areas and bedding sites. Typical forest open roads and trails have very low traffic levels except during deer season and generally would have little to no effect on deer activity.

Pond Improvements

No direct effects are anticipated for pond improvements. Indirectly, pond improvements would serve as important water sources and foraging area.

Wildlife Opening Improvement

There should be no direct effects to this species as deer are highly mobile at this time. Indirectly, wildlife opening improvement would increase and enhance the amount of available early seral habitat for these species within the watershed and provide areas of high nutrient forage habitat.

Glade Restoration

Direct and indirect effects would be the same as timber and prescribed burning treatments.

Watershed Restoration

Watershed restoration activities would be used to protect wildlife, soil and water resources. No direct impacts to deer are anticipated since actions would be close to currently open and closed roads/trails; reassign designation of existing roads and rehabilitate impacted areas. Indirect effects would be beneficial since the proposed activities would provide linear flight and travel corridors and allow these areas to re-vegetate thus providing potential foraging habitat.

Nest Boxes Installation

No direct or indirect impacts are anticipated as a result of placing nest boxes in the project area. Placement would require minimal ground disturbance and would not result in a loss of habitat.

No Herbicide Use

The effects of this alternative would be the same as the proposed action except the effects attributed to herbicide application would not occur.

Cumulative Effects

There are no past, present, or reasonably foreseeable future actions that would be additive to the effects of this project.

Pileated Woodpecker *(Dryocopus pileatus)*

Pileated Woodpecker is a member of the cavity nesting, tree trunk probing, insectivore guild, that prefers dense, mature to over mature hardwood, hardwood-pine and mature pine forest types. The most important characteristics of forest used by pileated woodpeckers are forest contiguity, mature trees and snags, openness of forest floor, amount of decaying wood litter, and a relative humidity that promotes fungal decay and the ant, termite, and beetle populations upon which these birds feed (Bull and Jackson, 1995) Pileated woodpeckers are a primary excavator of cavities important to obligate secondary cavity nesters, and are a key indicator for the retention of a complete community of cavity nesting species. Nest cavities are constructed by both sexes usually in dead limbs and trunks in areas that are shaded most of the day.

Population trend and habitat capability data for this bird are mixed (USDA Forest Service, 2011). The Breeding surveys data indicates a downward trend of 1.18% for Arkansas from 1966-2012 with a less intense decrease of 0.99% in most recent years, from 2002-2012 (Sauer, et al,. 2014). The CompPATS wildlife model takes into account the condition in all forest types, and it factors in management practices including prescribed fire and thinning. These data show a downward trend for the last 5 years, but a long-term upward trend. The overall situation should continue to improve as the unmanaged hardwood and hardwood-pine and the managed pine snag age. The current habitat capability that is estimated to support 11,580 birds exceeds the 2005 RLRMP bird population objectives of 11,265 for FY 2015 (USDA Forest Service 2005b) but is trending towards the FY 2016 desired capability.

Direct and Indirect Effects

No Action

This alternative would have a positive effect on the forest-wide trend for this species due to the retention of dead and dying trees found throughout the landscape. Management activities would be deferred; preferred habitat, including a snag component, would continue to be available for this species.

Proposed Action

This alternative would have no effect on the forest-wide trend for this species. However, the current population density and habitat capability exceed the Revised Forest Plan population objectives, and its habitat appears to be secure within the Forest.

Timber Management *(regeneration harvest (seed-tree, clearcut for shortleaf restoration) thinnings (precommercial, commercial, woodland), mechanical site preparation, chop/rip/hand plant shortleaf pine seedlings, mechanical timber stand improvement and midstory reduction)*

This species could lose active nests if harvest is conducted during the nesting season, but adults would be expected to move to undisturbed habitat and perhaps re-nest. These treatments would also have both negative and positive indirect effects on woodpeckers due to the removal of trees from the landscape reducing the upper tree canopy. Since this species prefer closed canopy forest they would be expected to abandon those portions of the harvest area with little or no closed tree canopy. However, standards established in the RLRMP (USDA Forest Service, 2005a) for the retention of hardwoods and snags in harvest areas would mitigate impacts to woodpeckers' foraging and nesting habitats. Fallen trees and snags created as a result of timber management activities would also enhance foraging and nesting habitat opportunities for woodpeckers.

Chemical Treatments *(chemical site preparation, chemical timber stand improvement and non-native invasive plant species control)*

Direct contact with herbicides (or feeding on insects that have been exposed to herbicides) could potentially harm woodpeckers. Vegetation impacted by herbicide treatment is not typically used as foraging substrate by woodpeckers because it decomposes rapidly and does not host preferred insect prey species. Overall, there should be no substantial direct effects on this woodpecker under this alternative.

Prescribed Burning *(fire restoration treatments and fuel reduction)*

Adult birds are highly mobile and would experience no direct effects. Growing season burns could directly affect nests with eggs and nestlings if the cavity tree in which they occur is damaged or felled due to burn-through, or perhaps abandoned if exposed to prolonged periods of smoke.

Indirect effects may include the loss of large snags (and potential nest sites) felled as a result of burning activities, but snags are rarely consumed and if felled by burn-through would contribute to foraging substrate as logs. Prescribed fire would also enhance and encourage growth of herbaceous and woody ground cover responsible for berry and seed production and resulting enhanced insect populations.

Road/Fireline Construction, Reconstruction, Decommission and Maintenance; Trail Relocation Treatments

Nest with eggs may be destroyed or abandon if road, fireline or trail construction results in the removal of snags containing nests. Mobile adults would not be impacted. Woodpeckers may be

displaced from nest sites if road construction and prolonged use occur adjacent to occupied snags during nesting season. Disturbance from fireline and trail construction would be brief as equipment quickly passes through any particular area. Firelines receive minimal and infrequent use and have less disturbance impact than roads. Closed roads and fireline would provide flight corridors through dense timber.

Pond Improvements

Pond improvements do not provide suitable foraging or nesting habitat for woodpeckers thus no impacts to woodpeckers are anticipated.

Wildlife Opening Improvement

Wildlife opening improvement does not provide suitable foraging or nesting habitat for woodpecker and thus no impacts to woodpeckers are anticipated.

Glade Restoration

Direct and indirect effects would be the same as timber and prescribed burning treatments.

Watershed Restoration

Watershed restoration activities would be used to protect wildlife, soil and water resources. No direct impacts to woodpeckers are anticipated since actions would be close to currently open and closed roads/trails; reassign designation of existing roads and rehabilitate impacted areas. Indirect effects would be beneficial since the proposed activities would provide linear flight and travel corridors.

Nest Boxes Installation

No direct or indirect impacts are anticipated as a result of placing nest boxes in project area. Placement would require minimal ground disturbance and would not result in a significant loss of habitat.

No Herbicide Use

The effects of this alternative would be the same as the proposed action except the effects attributed to herbicide application would not occur.

Cumulative Effects

There are no past, present, or reasonably foreseeable future actions that would be additive to the effects of this project.

Scarlet Tanager *(Piranga olivacea)*

The preferred habitats for this Neotropical migrant are composed of various types of deciduous forest, pine-oak woodlands, parks, orchards, and large shade trees in suburban areas (Senesac, 1993; Bushman and Therres, 1988; Isler and Isler, 1987). Scarlet tanagers are most common in areas with closed canopy, a dense understory with high shrub diversity, and little ground cover (Bushman and Therres, 1988). Tanagers are insectivorous during the breeding season feeding on prey items such as aphids, weevils, woodborers, leaf beetles, cicadas, scale insects, dragonflies, ants, termites, caterpillars, moths, parasitic wasps, and bees. Foraging often occur mid-canopy with frequent sallies into the air to catch flying insects.

Forest Service trends are showing slight population increases overall (USDA Forest Service, 2011). Breeding Surveys results from 1966-2012 in Arkansas indicate a slightly declining population, with a 0.33% reduction in population levels (Sauer, et al., 2014). However, in the most recent time period, from 2002-2012, populations in Arkansas have seen a 0.10% increase (Sauer, et at., 2014).

Direct and Indirect Effects

No Action

This alternative would have a positive effect on the forest-wide trend for this species. Management activities would be deferred; mature forest habitat preferred by this species would remain unchanged.

Proposed Action

This alternative would have no effect on the forest-wide trend for this species, given the stability of the mature hardwood forests it inhabits and the stable population trend it holds across its overall range.

Timber Management *(regeneration harvest (seed-tree, clearcut for shortleaf restoration) thinnings (precommercial, commercial, woodland), mechanical site preparation, chop/rip/hand plant shortleaf pine seedlings, mechanical timber stand improvement and midstory reduction)*

This species could lose active nests if harvest is conducted during the nesting season, but adults would be expected to move to undisturbed habitat and perhaps re-nest. These treatments would also have both negative and positive indirect effects on tanagers due to the removal of trees from the landscape reducing the upper tree canopy. Since this species prefer closed canopy forest they would be expected to abandon those portions of the harvest area with little or no closed tree canopy. The proposed timber activities would improve future nesting and foraging habitat for tanagers by helping to improve health and vigor of oak/hickory forest communities as a result of decreased competition.

***Chemical Treatments** (chemical site preparation, chemical timber stand improvement and non-native invasive plant species control)*

Direct contact with herbicides (or feeding on insects that have been exposed to herbicides) could potentially harm tanagers. Since tanagers are primarily mid-to-upper canopy foragers it is unlikely that effects of herbicide application would be encountered. However, tanagers feed on a wide variety of insect prey, many of which spend time in or traveling through understory vegetation where herbicide application would occur. Although tanagers may consume some insect prey that has been exposed to herbicide treatments the realistic dose estimates for such exposures would be insignificant.

***Prescribed Burning** (fire restoration treatments and fuel reduction)*

Prescribed fire during the nesting season could temporarily displace adults or cause nest abandonment by adults. Beneficial impacts to fruit, seed and insect production would result from prescribed fire, especially in pine forest types. Prescribed fire would have little effect on hardwood stands because of higher moisture levels in the soil, increased shading, reduced fire intensity, and reduced levels of fine fuels, other than leaves needed to carry fire.

Road/Fireline Construction, Reconstruction, Decommission and Maintenance; Trail Relocation Treatments

The felling and removal of timber during road building, fireline and trail construction activities could result in loss of eggs or nestlings, if present, but would have no effect on mobile adult birds. Birds may be displaced from nest sites, especially if road construction and prolonged use occurs adjacent to occupied nest. Fireline and trail construction would occur quickly, receive little use, and would have less impact than open roads. Closed roads and firelines would provide flight corridors through dense timber and possibly areas to forage for fruits and insects.

Pond Improvements

Pond improvements do not provide suitable foraging or nesting habitat for tanagers thus no impacts to tanagers are anticipated.

Wildlife Opening Improvement

Wildlife opening improvement does not provide suitable foraging or nesting habitat and thus no impacts are anticipated.

Glade Restoration

Direct and indirect effects would be the same as timber and prescribed burning treatments.

Watershed Restoration

Watershed restoration activities would be used to protect wildlife, soil and water resources. No direct impacts to tanagers are anticipated since actions would be close to currently open to closed

roads/trails; reassign designation of existing roads and rehabilitate impacted areas. Indirect effects would be beneficial since the proposed activities would provide linear flight and travel corridors.

Nest Boxes Installation

No direct or indirect impacts are anticipated as a result of placing nest boxes in project area. Placement would require minimal ground disturbance and would not result in a significant loss of habitat.

No Herbicide Use

The effects of this alternative would be the same as the proposed action except the effects attributed to herbicide application would not occur.

Cumulative Effects

There are no past, present, or reasonably foreseeable future actions that would be additive to the effects of this project.

Aquatic MIS

This project is within the Ouachita Mountain Streams Ecoregion. Three of the MIS fish species of the Ouachita Mountain Ecoregion have no known occurrences in the drainages involved in the proposed analysis area, either at the project site, or downstream. As a result, Channel Darter (*Percina copelandi*), Redfin Darter (*Etheostoma whipplei*) and Johnny Darter (*Etheostoma nigum*) were not selected as MIS (Caddo/Womble stream survey records 1991-2013 (Robison and Buchanan, 1988).

AQUATIC MIS AND ASSOCIATED PURPOSES (TABLE 3.8)

Life Form	Scientific Name	Common Name	Primary Reason for Selection
Fish	*Campostoma spadiceum*	Highland Stoneroller	To help indicate effects of management activities on aquatic habitat and water quality in streams within the Ouachita Mountain Ecoregion.
Fish	*Etheostoma radiosum*	Orangebelly Darter	
Fish	*Fundulus catenatus*	Northern Studfish	
Fish	*Hypentilium nigricans*	Northern Hog Sucker	
Fish	*Lepomis cyanellus*	Green Sunfish	
Fish	*Lepomis megalotis*	Longear Sunfish	
Fish	*Luxilus chrysocephalus*	Striped Shiner	
Fish	*Ameiurus natalis*	Yellow Bullhead	
Fish	*Micropterus dolomieu*	Smallmouth Bass	To help indicate effects of management activities on meeting public fishing demand in streams

Previous Forest-wide trends for the 9 aquatic MIS species selected will be discussed

individually, based on the Final Environmental Impact Statement (FEIS) (USDA FS 2005b) for the Revised Forest Plan, as well as the ONF Monitoring and Evaluation Report for the Land and Resource Management Plan (USDA Forest Service, 2011). These documents summarize monitoring information for MIS species over the past decade, while providing an assessment of each MIS species' current status and conservation needs.

Highland Stoneroller

Highland Stonerollers generally inhabit small to medium streams with cool, clear water and gravel, cobble or exposed bedrock substrates. They are sometimes found in upland impoundments and slow-moving, turbid water (Robison and Buchanan 1988). Highland Stonerollers are common across the Forest, with populations fluctuating from year to year. Many factors, biotic and abiotic and natural and man-caused contribute to these fluctuations. Over time, these populations appear to be stable. The conservation of this species across the forest is not in question. Based on Basin Area Stream Surveys (BASS) and other Forest stream surveys, there appear to be no adverse effect on highland stoneroller populations as a result of forest management activities.

Orangebelly Darter

Orangebelly Darters occur in a variety of habitats from small, gravelly, high-gradient streams, to larger, more sluggish lowland rivers. This darter is most common in clear, gravel cobble-bottomed streams with moderate to high gradient (Robison and Buchanan, 1988). Orangebelly Darters are relatively abundant in the ONF, particularly in the Lower Ouachita Mountain Ecoregion. Population densities appear to fluctuate but remain relatively stable over time. The conservation of this species across this ecoregion is not in question. Based on BASS and other Forest stream surveys, there appears to be no adverse effect on Orangebelly Darter populations from forest management activities.

Northern Studfish

Northern Studfish occurs in the Ouachita Mountains in clear streams and rivers of moderate to high gradient and permanent flow. It is usually found in quiet, shallow waters along the margins of pools having rock and gravel substrate. The conservation of this species is not thought to be in question because of its common occurrence across a wide area (Robison and Buchanan, 1988). Based on BASS and other Forest stream surveys, there appears to be no adverse implications for Northern Studfish populations as a result of Forest management activities.

Northern Hog Sucker

The Northern Hog Sucker occurs in clear, permanent streams with gravel or rocky substrate and generally prefers deep riffles, runs, or pools having a current. It is intolerant of pollution, silt, and stream channel modification (Robison and Buchanan, 1988). Based on stream monitoring data, it appears that Northern Hog Sucker populations on the ONF remain stable. There is no information to suggest that the Northern Hog Sucker has conservation concerns on ONF. There are also no indications to suggest that management activities are having a direct or indirect effect on populations of the Northern hog sucker.

Green Sunfish

The Green Sunfish is an adaptable species that occurs in a variety of aquatic habitats, and is tolerant of a wide range of ecological conditions, particularly to extremes of turbidity, dissolved oxygen, temperature, and flow (Robison and Buchanan 1988). Based on BASS inventory data, it appears that populations of Green Sunfish fluctuate from year to year. Many factors, biotic and abiotic, natural and man-caused, contribute to these fluctuations. Percent site occurrence and population densities indicate that managed streams and reference streams are similar for Green Sunfish. There are no indications that Green Sunfish are increasing as a result of management activities. The conservation of this species is not in question.

Longear Sunfish

Longear Sunfish occur in a variety of habitats but is most abundant in small, clear, upland streams with rocky bottoms and permanent or semi-permanent flow. It avoids strong current, turbid water, and silt substrate (Robison and Buchanan, 1988). Based on BASS inventory data, populations of Longear Sunfish fluctuate from year to year, but appear to be stable over time. Percent site occurrence and population densities indicate that managed streams and reference streams are similar for this species. Longear Sunfish are commonly distributed throughout much of the Upper and Lower Ouachita Mountain Ecoregions. There appears to be no adverse effect on Longear Sunfish from Forest management activities. The conservation of this species across these ecoregions is stable and is not in question.

Striped Shiner

The Striped Shiner is abundant in the Ouachita mountains and seems to prefer small to moderate-sized perennial streams with permanent flow, clear water, and rocky or gravel substrate. It occurs in some current, but avoids strong current preferring the pool habitats within the streams (Robison and Buchanan, 1988). Based on stream surveys and BASS inventory data, there appears to be wide fluctuations in populations of Striped Shiners on the Forest, with no apparent upward or downward trends. Striped Shiners are common throughout the Lower Ouachita Mountain Ecoregion. The conservation of this species in the ONF is not in question. Based on BASS inventory data and other Forest stream surveys, Forest management activities appear to have no adverse effect on Striped Shiner populations.

Yellow Bullhead

The Yellow Bullhead is a heavy-bodied, small-eyed catfish widely distributed and found throughout the state. This species occupies a variety of habitats but prefers clear, gravel and rocky-bottomed, permanent streams where it avoids strong current. This fish is also common in reservoirs. Although viability of this species is not in question, managed and unmanaged streams have seen declines in percent occurrence of bullheads in BASS samples, possibly due to siltation of streams from travel-ways due to inadequate road maintenance (USDA Forest Service, 2011).

Smallmouth Bass

The Smallmouth Bass is mainly found in cool, clear mountain streams with permanent flow and rocky bottoms. This species is common only on the southern part of the ONF. The Smallmouth Bass does not tolerate habitat alteration in comparison to the other two black basses (Spotted and Largemouth Basses), and it is especially intolerant of high turbidity and siltation (Robison and Buchanan, 1988). The BASS data on the ONF indicate that both site occurrence percentages and population densities of Smallmouth Bass are similar between reference and managed watersheds. This implies that Forest Service management activities are having no adverse effects on Smallmouth Bass populations.

Direct and Indirect Effects

No Action

This alternative would have no effect on the forest-wide trends for MIS fish species. Stream sedimentation from proposed management actions would not occur; however, some existing sediment sources would not be remedied (areas of eroded soils, road repairs).

Proposed Action

The Proposed Action would have no effect on the forest-wide trends for MIS fish species.

Timber Management *(regeneration harvest (seed-tree, clearcut for shortleaf restoration) thinnings (precommercial, commercial, woodland), mechanical site preparation, chop/rip/hand plant shortleaf pine seedlings, mechanical timber stand improvement and midstory reduction)*

None of the proposed timber management activities are expected to have any effects on MIS fish species. These species and its habitats are currently protected by streamside management areas, as defined in the Revised Forest Plan.

Chemical Treatments *(chemical site preparation, chemical timber stand improvement and non-native invasive plant species control)*

Glyphosate, imazapic, imazapyr, picloram, and triclopyr for site preparation, seedling release, and control of non-native invasive species (NNIS). Neither the published literature nor the U.S. EPA files (U.S. EPA/OPP 1993, 1998) include data regarding the toxicity of these chemicals or their formulations on these MIS fish species. Most all bioassay studies use various fish species, mainly bluegill, which has been used as the closest representative in the table below.

SUMMARY OF LD_{50} VALUES FOR BLUEGILL (TABLE 3.9)

Active Ingredient	LD50*	Toxicity Risk to Bluegill	Risk Assessment
Glyphosate	70-170mg/L	Practically Nontoxic	Syracuse Environmental Research Associates, Inc. 2011
Imazapic	>100mg/L	Practically Nontoxic	Syracuse Environmental

Active Ingredient	LD50*	Toxicity Risk to Bluegill	Risk Assessment
			Research Associates, Inc. 2004
Imazapyr	>100mg/L	Practically Nontoxic	Syracuse Environmental Research Associates, Inc. 2011a
Picloram	Varies greatly with formulation	Appears to be somewhat toxic with great variation	Syracuse Environmental Research Associates, Inc. 2011c
Triclopyr	Varies greatly with formulation	Appears to be somewhat toxic with great variation	Syracuse Environmental Research Associates, Inc. 2011b

LD50* - lethal concentration for 50% of population tested

Herbicide application in site preparation and timber stand improvement areas is not likely to have any impacts on MIS fish. All streams would be protected by 30 and 100-foot herbicide application buffers; all source waters would be protected by 300-foot buffers. Buffers are to be clearly marked (design criteria HU006) before treatment so applicators can easily see and avoid them (USDA Forest Service, 2005a).

Effects to these MIS fish could occur as a result of contact with herbicide, with personnel applying herbicide, or an accidental chemical spill, but are not likely due to approximately 99% of NNIS treatments would occur outside streamside management areas (aquatic habitats).

Prescribed Burning *(fire restoration treatments and fuel reduction)*

Effects from prescribed fire would vary due to fire intensity, aspect, and slope; it would be expected that some degree of forest floor cover would be removed. Prescribed burns would occur over the majority of the analysis area sometime during the 10 years following project implementation. No direct or indirect effects are anticipated for these aquatic species as a result of the proposed prescribed fire activities. The proposed activities would not cause any impacts due to the guidelines within the MA9 of RLMP.

Road/Fireline Construction, Reconstruction, Decommission and Maintenance; Trail Relocation Treatments

As drainage structures are installed, and road/firelines/trail are reconstructed/constructed and shaped, removal of vegetative cover and soil disturbance would temporarily increase sedimentation, concentrate runoff, and potentially impact water quality for these MIS fish. Conversely, existing sedimentation would be reduced by proposed reconstruction and road maintenance treatments. The potential for sedimentation would be reduced by implementing Revised Forest Plan design criteria: firelines crossing streamside management areas would be constructed using hand tools; firelines would be water barred and seeded after construction.

Pond Improvements

Wildlife ponds within the project area are meant to provide a source of water and habitat for non-fish species such as amphibians, reptiles, insects and other non-fish species. No direct or indirect

impacts to these MIS fish are anticipated.

Wildlife Opening Improvement

Sites do not contain suitable habitat capable of supporting these MIS fish species. No direct or indirect impacts to these MIS fish species are anticipated.

Glade Restoration

No direct or indirect impacts on these aquatic species are anticipated because all proposed activities are located outside the suitable habitat.

Watershed Restoration

Proposed watershed restoration would be used to protect aquatic, wildlife, soil and water resources. Activities could have a direct effect on these species by individuals being crushed during restoration work were it to occur in the stream when these fish are present but is unlikely due to the limited area of impact. All other proposed watershed restoration activities will have no direct effect. Indirect effects could occur from increased siltation during restoration activities, but would be a temporary disturbance and short in duration and not expected to pose an increased risk to these species. In an effort to avoid impacts, all work within SMAs would take place during low flow periods.

Nest Boxes Installation

Proposed treatments would have no direct or indirect impacts on MIS fish species because all proposed treatment sites are located outside of suitable habitats.

No Herbicide Use

The effects of this alternative would be the same as the proposed action except the effects attributed to herbicide application would not occur.

Cumulative Effects

There are no past, present, or reasonably foreseeable future actions that would be additive to the effects of this project.

Proposed, Threatened, Endangered and Sensitive Species (PETS) & Habitat

Eighty PETS species were reviewed for occurring or potentially occurring in the analysis area (Regional Forester's Sensitive Species list, Forest Service's Sensitive Species List, Arkansas natural Heritage Commission inventories of PETS species locations). The table below lists PETS species that occur or potentially occur in the analysis area, and would be affected by proposed project activities.

PETS SPECIES EVALUATED (TABLE 3.10)

Group	Scientific Name	Common Name	Status
Mammal	*Mytotis septentrionalis*	Northern Long-eared bat	Threatened
Mollusks	*Lampsilis powellii*	Arkansas fatmucket	Threatened
Mollusks	*Theliderma cylindrical*	Rabbitsfoot mussel	Threatened
Mollusks	*Cyprogenia aberti*	Western fanshell	Sensitive
Mollusks	*Pleuraobema rubrum*	Pyramid pigtoe	Sensitive
Mollusks	*Alamidonta marginata*	Elktoe	Sensitive
Mollusks	*Toxolasma lividum*	Purple Lilliput Pearly	Sensitive
Fish	*Noturus taylori*	Caddo madtom	Sensitive
Fish	*Percina brucethompsoni*	Ouachita darter	Sensitive
Fish	*Notropis perpallidus*	Peppered Shiner	Sensitive
Fish	*Percina uranidea*	Stargazing shiner	Sensitive
Mammal	*Perimyotis subflavus*	Tri-colored bat	Sensitive
Mammal	*Myotis austroriparius*	Southeastern myotis	Sensitive
Insect	*Danaus plexippus*	Monarch butterfly	Sensitive
Vascular Plant	*Cypripedium kentuckiense*	Kentucky lady-slipper	Sensitive
Vascular Plant	*Carex latebracteata*	Waterfall's sedge	Sensitive
Vascular Plant	*Castanea pumila var. ozarkensis*	Ozark chinquapin	Sensitive
Vascular Plant	*Eriocaulon koernickianum*	Gulf pipewort	Sensitive
Vascular Plant	*Vernonia lettermannii*	Narrowleaf ironweed	Sensitive
Vascular Plant	*Valerianella nuttalli*	Nuttall's cornsalad	Sensitive
Vascular Plant	*Draba aprica*	Open ground draba	Sensitive
Vascular Plant	*Amorpha ouachitensis*	Ouachita false indigo	Sensitive
Vascular Plant	*Valerianella palmeris*	Palmer's cornsalad	Sensitive

Bats: Northern long-eared *(Myotis septentrionalis)*; **Tri-colored** (*Perimyotis subflavus);* **Southeastern myotis** *(Myotis austroriparius)*

Northern long-eared bat *(Myotis septentrionalis)* **Threatened**

The northern long-eared bat was considered a subspecies of Keen's long-eared myotis (Myotis keenii), but in 1979 was recognized as a distinct species based on geographic separation and difference in morphology (FR Doc. 2011–16344).

The range of the northern long-eared bat includes much of the eastern and north central United States, and all Canadian provinces from the Atlantic Ocean west to the southern Yukon Territory and eastern British Columbia. Within the United States, this area includes the following 39

States: Alabama, Arkansas, Connecticut, Delaware, the District of Columbia, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Vermont, Virginia, West Virginia, Wisconsin, and Wyoming (USDI FWS 2013).

Within Arkansas, the northern long-eared bat is known to occur in Baxter, Benton, Garland, Independence, Jackson, Marion, Montgomery, Newton, Pike, Polk, Scott, Stone, Washington, and Yell counties (Saugey et al. 1993). NLEB is a common species in Arkansas and is found in all counties within Ouachita National Forest (Sasse et al. 2014), as well as Le Flore and McCurtain Counties in Oklahoma (ODWC 2013). The closest known, occupied hibernaculum to the project area is 10.3 miles to the south and the closest know NLEB roost trees are over 29 miles at Alum Creek Experimental Forest on Winona Ranger District.

Northern long-eared bats spend winter hibernating in caves and mines, called hibernacula. They typically use large caves or mines with large passages and entrances; constant temperatures; and high humidity with no air currents. Specific areas where they hibernate have very high humidity, so much so that droplets of water are often seen on their fur. Within hibernacula, surveyors find them in small crevices or cracks, often with only the nose and ears visible (USDI FWS 2013).

During summer, northern long-eared bats roost singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees. Males and non-reproductive females may also roost in cooler places, like caves and mines. This bat seems opportunistic in selecting roosts, using tree species based on suitability to retain bark or provide cavities or crevices. It has also been found, rarely, roosting in structures like barns and sheds (USDI FWS 2013).

Breeding begins in late summer or early fall when males begin swarming near hibernacula. After copulation, females store sperm during hibernation until spring, when they emerge from their hibernacula, ovulate, and the stored sperm fertilizes an egg. This strategy is called delayed fertilization (USDI FWS 2013).

After fertilization, pregnant females migrate to summer areas where they roost in small colonies and give birth to a single pup. Maternity colonies, with young, generally have 30 to 60 bats, although larger maternity colonies have been observed. Most females within a maternity colony give birth around the same time, which may occur from late May or early June to late July, depending where the colony is located within the species' range. Young bats start flying by 18 to 21 days after birth. Adult northern long-eared bats can live up to 19 years (USDI FWS 2013).

Northern long-eared bats emerge at dusk to fly through the understory of forested hillsides and ridges feeding on moths, flies, leafhoppers, caddisflies, and beetles, which they catch while in flight using echolocation. This bat also feeds by gleaning motionless insects from vegetation and water surfaces (USDI FWS 2013).

Tricolored bat *(Perimyotis subflavus)* **Sensitive**

The tricolored bat formerly known as the Eastern pipistrelle was historically, one of the most common bat species found throughout the eastern forests of America. Ranging from Nova Scotia and Quebec, south throughout the east coast of Mexico into northern Central America.

These bats are associated with intact forested landscapes, where they forage around nearby trees and waterways (Fujita and Kunz 1984); however, most foraging has been found to occur in riparian areas (Ellis et al. 2002, Ford et al. 2005, Menzel et al. 2005). Deciduous forest, in the spring and summer months within western North Carolina, nonreproductive individuals select mature stands near perennial streams, and they tended to roost near openings (O'Keefe et al. 2009).

Maternity and other summer roosts probably are mainly in dead or live tree foliage (including attached lichen clumps such as *Usnea* and "Spanish moss") (Carter and Menzel 2007, Poissant et al. 2010); caves, mines, and rock crevices may be used as night roosts between foraging forays (Barbour and Davis 1969). Maternity colonies also may utilize human-made structures, buildings and bridges (Ferrara and Leberg 2005), or tree cavities. This species may choose open sites that would not be tolerated by most other bats (Barbour and Davis 1969). In summer in Arkansas, roosts were most often among dead leaves of oaks in mature (>50-year-old) forest with a relatively complex structure and a hardwood component, but 3 of 7 maternity roosts were in clumps of dead needles of live, large pines (Perry and Thill 2007). In Indiana, pregnant and lactating females roosted exclusively in foliage, typically in clusters of dead leaves and less often in live foliage or squirrel nests (Veilleux et al. 2003). In Indiana, Veilleux and Veilleux (2004) provided limited evidence that females are faithful to small roost areas both within and between years, and that juvenile females exhibit female natal philopatry. Reproductive females roost alone or in groups of up to 50 individuals (Perry and Thill 2007).

Hibernation sites often are in caves (Briggler and Prather 2003), mines, or cavelike tunnels (Slider and Kurta 2011), also box culverts under highways, especially those near forest (Sandel et al. 2001). Kurta et al. (2007) recorded hibernation in a dam and colonization of a cave that had been highly altered for commercialization. The closest known, occupied hibernaculum is 6.3 miles south of the project area.

Tricolored bats mate in October to November with usually two pups born May to June in the southern states (NatureServe 2018). Young are able to fly within a month, and are typically sexually mature the first summer. This species likely travels up to a 5-mile radius from its roosting site for foraging (Veilleux et al. 2003). Tricolored bats tend to roost in low densities, small groups, or solitary, and hibernating individuals perch singly, infrequently in small groups (NatureServe 2018). Maternity colonies are also small in size.

Southeastern myotis (*Myotis austroriparius*) **Sensitive**

The southeastern myotis (SOMY) range is from Indiana and Illinois south along the Mississippi River and around the southeastern states to Florida. Few maternity colonies have been found in other states outside of Florida. SOMY uses a variety of roosts and habitats including hollow trees in forested areas, but also bridges, buildings, and culverts. SOMY are closely associated with caves, and use them for maternity colonies. The species has long been considered polytypic

and has been divided into three subspecies: *M. a. austroriparius*, *M. a. gatesi*, and *M. a. mumfordi*. However research had been conducted and showed that this species should be considered monotypic (La Val, 1970; Whitaker and Hamilton, 1998).

This bat appears to remain active for much of the year in the southern portions of its range, feeding on a large variety of aquatic insects. The extent to which this species relies upon forest resources is largely unknown, but recent radio-tracking studies have documented maternity colonies in areas of hardwood swamps, so perhaps their numbers are greater than once suspected in these areas. Some populations of SOMY appear to be in steady decline and this bat is considered a Species of Concern by the U.S. Fish and Wildlife Service.

Direct and Indirect Effects

No Action

This alternative would have no direct effects on the Northern long-eared, Tri-colored and Southeastern myotis bats. Indirect effects would include the natural succession of early seral habitats into mature forest. This process could result in an overall decline of foraging habitat and open mid-story for ease of movement.

Proposed Action

Timber Management *(regeneration harvest (seed-tree, clearcut for shortleaf restoration) thinnings (precommercial, commercial, woodland), mechanical site preparation, chop/rip/hand plant shortleaf pine seedlings, mechanical timber stand improvement and midstory reduction)*

Timber management treatments all have the potential to both positively and negatively affect both bat species within the project area. For instance, falling trees could directly affect roosting bats and/or maternity sites. Roosting and/or maternity sites could potentially be felled or damaged by cutting that would occur in a densely stocked offsite loblolly pine stands. These loblolly stands would be restored to shortleaf pine. However, direct effects are expected to be minimal because there are no known roost trees or maternity trees in the project area.

Disturbance within treatment areas may also cause bat species to temporarily abandon sites but actions would not likely exclude bats from foraging in areas. Thinning of forest stands could indirectly alter foraging areas and temporarily change insect populations and densities within treatment areas. Insect populations would likely increase with increased plant diversity due to more open conditions. No direct or indirect effects would occur to wintering bats because there are no know hibernacula in the project area. The closest known northern long-eared bat hibernaculum is 10.3 miles and the tri-colored 6.3 miles from the projects area no suitable mine habitat is within the project area.

Chemical Treatments *(chemical site preparation, chemical timber stand improvement and non-native invasive plant species control)*

The following herbicide active ingredients have been proposed for the control of non-native invasive species; Glyphosate, Imazapic, Imazapyr, Picloram and Triclopyr. Since no risk

assessment studies have been conducted specific to neither bat species, we used the rat risk as an analog.

SUMMARY OF LD_{50} VALUES FOR RAT (TABLE 3)

Active Ingredient	LD_{50}*	Toxicity Risk to Rat	Risk Assessment
Glyphosate	>5000 mg/kg bw	Relatively Nontoxic	Syracuse Environmental Research Associates, Inc. 2011a
Imazapic	>5000 mg/kg bw	Relatively Nontoxic	Syracuse Environmental Research Associates, Inc. 2004d
Imazapyr	>5000 mg/kg bw	Relatively Nontoxic	Syracuse Environmental Research Associates, Inc. 2011b
Picloram	>4012 mg a.e./kg	Relatively Nontoxic	Syracuse Environmental Research Associates, Inc. 2011c
Triclopyr	>1000 mg/kg bw	Nontoxic	Syracuse Environmental Research Associates, Inc. 2011d

LD50*- lethal dose for 50% of population tested

Direct effects to all three bats are unlikely due to herbicide applications for chemical site preparation, timber stand improvement and non-native invasive plants control treatments occurring during the day when bats are not active. Due to northern long-eared bats emergence times, it is highly unlikely that individuals themselves would come into contact with recently sprayed vegetation. By dusk, herbicides should be dried on the substrate on which they were sprayed (Lacki et al. 2007). However, there is a possibility that these bats can consume insects that have been contaminated or sickened by the herbicide treatments. Positive indirect effects could occur from potentially reducing hardwood vegetation during chemical site prep and increasing early seral vegetation and consequently the insect population numbers and/or diversity in treatment areas. Reduction of non-native invasive species would also improve the native plant populations which could increase insect populations in the area.

Prescribed Burning *(fire restoration treatments and fuel reduction)*

Prescribed burning would not directly affect northern long-eared and tri-colored bats in the winter because there are no hibernacula's in the project area. Fire from prescribed burning could directly affect these bat species by burning up roost or maternity trees if occurring during the active bat seasons, but would be unlikely because the majority of burns occur in the dormant growing season and there are no known roost trees or maternity trees in the project area. Indirect effects of prescribed burns would be to possibly reduce the amount of understory vegetation that inhibits free bat movement and foraging activity by maintaining uncluttered foraging pathways and easier access to roost trees and disturbance from smoke may also cause bats to temporarily abandon treatment sites but actions would not likely exclude bats from foraging. Proposed burns would occur over the majority of the project area and would be burned in sections during the next 10-year period and beyond. The variety of fire intensities that would occur due to environmental conditions would provide a habitat mosaic with varying degrees of mid-story vegetation removal and occasional over-story tree mortality. Prescribed fire would help maintain and create habitat for these bat species.

Road/Fireline Construction, Reconstruction, Decommission and Maintenance; Trail Relocation Treatments

Road/Fireline construction, reconstruction, decommission, maintenance and relocation treatments can have the potential to both positively and negatively affect these bat species within the project area. Road, fireline and trail relocation clearing, could directly affect roosting bat and /or maternity sites, resulting in damaged or removal of trees. If a maternity tree is felled, young non-volant pups could be killed. Disturbance within road/fireline construction, reconstruction and maintenance areas may also cause bats to temporarily abandon sites but, actions would not likely exclude bats from foraging in road corridor areas. No direct or indirect effects would occur to wintering northern long-eared bats because there are no known hibernacula in the road corridor. The closest Northern long-eared bat hibernaculum is 10.3 miles and Tri-colored bat hibernaculum is 6.3 miles from the project area and no suitable mine habitat is within the project area. However, direct effects are expected to be minimal because there are no known roost trees or maternity trees in the project area. Indirect benefits would be likely since proposed actions would provide linear flight corridors and linear foraging habitats for bats.

Pond Improvements

Wildlife ponds often support hydrophytic (water dependent plant species) vegetation not found in riparian systems which in turns supports a whole host of aquatic insect species also not found in streams and river systems. This diversity of vegetation and associated insect populations would provide foraging habitats for bats.

The direct and indirect effects of pond improvements to existing ponds would be similar to those for timber management and chemical treatments and to provide reliable water sources for the bats throughout the watershed.

Wildlife Opening Construction/Improvement

Wildlife openings play an important role in the foraging ecology of woodland bat species. Many bat species take advantage of wildlife openings since they support a high concentration of insects and a rich diversity of insect populations. The uncluttered flying space provided by openings allows bats to freely maneuver, find and catch insect prey and expend less energy than they normally would in a more heavily forested habitat dodging trees.

The direct and indirect effects of wildlife opening construction/improvement to the existing openings and new openings would be similar to those for timber harvest and non-native invasive treatments and to provide open foraging areas throughout the watershed.

Glade Restoration

Direct and indirect effects would be the same as timber and prescribed burning treatments.

Watershed Restoration

Proposed watershed restoration treatments would be used to protect wildlife, soil and water resources. No direct effects to these bats are anticipated since actions would be close to currently

open and closed roads/trails and rehabilitate impacted areas. Indirect benefits would be likely since proposed actions would provide linear flight corridors and linear foraging areas for bats.

Nest Boxes Installation

Boxes would be placed along ridges, flood plains and mid-slopes to provide summer roosting habitat and possible maternity roosting sites for tree roosting bat species. No direct impacts are anticipated for Northern long-eared, Tri-colored and Southern myotis bats from the placement of bat boxes. Currently there are nine North American bat species known to use bat houses seven of which occur in Arkansas. Northern long-eared bats along with other bat species (little brown bat, free-tailed bat, big brown bat, evening bat) that occur in the area would likely benefit from their placement.

No Herbicide

The effects of this alternative would be the same as the proposed action except the effects attributed to herbicide application would not occur.

Cumulative Effects

There are no past, present, or reasonably foreseeable future actions that would be additive to the effects of this project.

Mussels, Fish and Crustacean: Arkansas Fatmucket (*Lampsilis powellii*); **Rabbitsfoot** *(Theliderma cylindrical);* **Western fanshell** *(Cyprogenia aberti sp.CF Aberti*); **Purple lillitput** (*Toxolasma lividum)* **Pyramid pigtoe** (*Pleurobema rubrum*); **Elktoe** (*Alamidonta marginata*); **Caddo Madtom** (*Moturus taylori*); **Ouachita darter** (*Percina brucethompsoni);* **Peppered shiner** *(Notropis perpallidus);* **Stargazing darter***(Percina uranidea)*

Arkansas Fatmucket (*Lampsilis powellii*) **Threatened**

Arkansas Fatmucket mussel is known to occur in the Ouachita, Saline and Caddo Rivers. In the Ouachita River basin, it occurs upstream of Lake Ouachita in the main stem of the Ouachita River in Montgomery and Polk Counties, and in the South Fork Ouachita River in Montgomery County.

The mussel prefers deep pools and backwater areas that possess sand, sand-gravel, sand-cobble, or sand-rock with sufficient flow to periodically remove organic detritus, leaves and other debris. It inhabits slow flowing water where clean swept sand, gravel, and cobble substrate are essential habitat requirements. Gravid females have been found from January through April.

The range of the Arkansas Fatmucket has been curtailed and continues to be threatened by impoundments, channel alteration, gravel dredging, sedimentation, and water quality degradation (USDI-FWS, 1992). In the Ouachita River, its range has been reduced by the construction of Lakes Ouachita, Hamilton, and Catherine, and by the hypo-limnetic (cold and low in oxygen content) water releases from these impoundments. Water quality degradation apparently is responsible for the absence of the Arkansas Fatmucket from a significant area within the species;

probable historic range. Existing habitat in the Ouachita River may be less than satisfactory for this species (USDI-FWS, 1992).

The U.S. Fish and Wildlife Service noted in a five-year status review published in 2013 that extant populations of Arkansas Fatmucket occur throughout most of the historic range; however, population declines and reduced distribution have been documented since its listing as a threatened species. Catastrophic population declines have resulted in the extirpation of Arkansas Fatmucket from the South Fork Saline River, while the Caddo River, Ouachita River, South Fork Ouachita River, Middle Fork Saline River, and North Fork Saline River population have experienced substantial declines. Increasingly small and isolated populations are becoming more susceptible to unpredictable events and ongoing and/or increasing anthropogenic (human-caused) impacts.

Rabbitsfoot *(Quadrula cylindrical cylindrical)* **Threatened**

The historic range of the mussel includes the Ouachita, Mountain Fork, and Poteau Rivers of eastern Oklahoma and western Arkansas. This mussel has been found in the Forest during Vaughn's survey of the Glover River (1996) and her work in the upper Ouachita River during 1999. It was found in the Little River between the confluences of the Glover and Mountain Fork Rivers with the Little River. It is reported in the Saline River below the Forest (Harris et al., 1997).

Western Fanshell (*Cyprogenia aberti*) **Sensitive**

This species inhabits large creeks to large rivers with good water quality, moderate to swift current, and sand-gravel or sand-rock substrates. Its historical range included part of six central and southeastern states. It is now considered possibly extirpated from three of those states (Oklahoma, Louisiana, and Mississippi), imperiled in Arkansas and Missouri, and critically imperiled in Kansas (Nature Serve, 2009).

The Western Fanshell mussel is found in the upper Ouachita River and is considered rare to only moderately abundant (Harris and Gordon, 1990), as well as the Caddo River. This sensitive mussel potentially occurs in the South Fork Ouachita River, although it has not been recorded there (Harris et al., 1997).

Purple Lilliput (*Toxolasma lividus*) **Sensitive**

This species historically ranged from Ohio and Michigan south to Kentucky, Tennessee, and Virginia, westward to Arkansas and Oklahoma. In Arkansas, the Purple Lilliput mussel inhabits small creeks to medium size rivers, particularly backwater areas. It has been documented in the Poteau and South Fork Fourche in surveys Harris conducted in each (reports dated 1994, 1992, respectively). It has been taken throughout the headwaters of the Ouachita and Saline Rivers (Harris et al., 1997). It generally is found is low numbers where present.

Pyramid Pigtoe *(Pleurobema rubrum)* **Sensitive**

This species is found in large rivers, but may occur in medium sized lotic waters. It tends to occupy riffles or shoals in relatively shallow water and coarse-particle substrates, along sand bars, or in deep water with stable mud and muddy sand bottoms (Watters et al., 2009). Moderate to swift currents usually are associated with these habitats (Gordon and Layzer, 1989). Historically this species was distributed throughout the Mississippi, Wabash, Tennessee, and Ohio River systems. The species is fairly widespread and can be locally common in Arkansas in areas such as the Little Missouri, Saline and Ouachita Rivers (Harris et al., 1997).

Elktoe *(Alasmidonta marginata)* **Sensitive**

The elktoe ranges in the north of Canada south to Alabama and on the east from New York to Virginia and on the west from eastern North Dakota to northeastern Oklahoma, with the center of abundance being in Ohio, Indiana and Illinois (Parmalee and Bogan 1998)

This species occurs in large to medium sized streams, but more typical of smaller streams. Parmalee and Bogan (1998) state that it reaches its greatest abundance in small, shallow rivers with a moderately fast current in a mixture of fine gravel and sand. Buchanan (1980) found it to be common in gravel and cobble substrate in two to 18 inches of water, Neel and Allen (1964) found it to be more abundant in abundance in the mainstream Cumberland River than in small streams. Ortman (1919) described it as a riffle species that is found in swift current in firmly packed fine to course gravel.

Caddo madtom (*Noturus taylori*) **Sensitive**

The Caddo Madtom is found only in the Caddo, Little Missouri and upper Ouachita rivers. It lives under rocks in riffles or pools just below riffles in the gravel substrate of clear upland streams. Spawning occurs in late April to May (Robison and Buchanan, 1988). This species was probably never widespread, nor abundant.

Ouachita darter *(Percina brucethompsoni)* **Sensitive**

The entire range of this darter is within Arkansas, where it is known only from the upper Ouachita River above Lake Ouachita and the Little Missouri River from below Lake Gresson to it confluence with the Ouachita River. The former lower Caddo River population has apparently been extirpated by the tailwater effects of DeGray Dam (Robison and Buchanan, 1988). The Ouachita darter is primarily a pool inhabitant found in clear, silt-free upland streams. In the spring, it inhabits raceways of pools with gravel-cobble substrate and moderate to strong current, and it is generally found within water willow beds on the margins of these raceways. In the fall, it inhabits deeper pools with low flow over a sand substrate with aquatic vegetation. Spawning generally occur from April to mid-May. Populations are small and appear to be sensitive to environmental disturbance (Robison and Buchanan, 1988).

The decline in this species' abundance is attributed to habitat destruction and modification arising primarily form the construction of impoundments. Lesser factors contributing to habitat alteration include siltation from agricultural operations, commercial gravel operation, industrial and municipal effluents, and road construction. This species was probably never widespread, nor abundant.

The Forest Stream Ecologist conducted monitoring efforts in the spring and summer of 2000 on the Ouachita River between Pine Ridge and Shirley Creek Campground. Twelve sites were surveyed, and Ouachita darters were observed at eight of these sites. Monitoring of this species on the Ouachita River between Shirley Creek Campground and Oden continued in 2001 through a Challenge Coast Share Agreement with Arkansas Tech University. The 2001 Arkansas Tech University survey observed 74 Ouachita darters at seven sites within the study. The number of Ouachita darters observed at each site ranged from 2 to 18 versus a range of 2 to 6 for the 2000 study in the Ouachita River reach directly upstream (Moles and Gagen, 2002). Both the 2000 and 2001 surveys indicate that Ouachita darter populations are low for the Ouachita River. However, Moles and Gagen (2002) determined that low population estimations are more a reflection of available preferred habitat and that population numbers are not extremely low compared to other darter species.

Peppered Shiner (*Notropis perpallidus*) **Sensitive**

The Peppered Shiner is found only within the Ouachita Mountain River system within southeast Oklahoma and southwest Arkansas. In Arkansas, this rare member of the minnow family is found only in the Saline, Antoine, Caddo, Little Missouri, and upper Ouachita rivers. It inhabits pool regions 2-4 feet deep in moderate-sized, warm, clear rivers and is rarely found in small streams. Typically, it occurs in the lee of islands and other obstructions away from the main current. This species occurs in small populations and occurs sporadically in its range (Robison and Buchanan, 1988). This species was probably never widespread, nor abundant.

Additional Survey Information

Dr Robinson collected peppered shiners from only two of fifteen sites surveyed on the upper Ouachita River in a 1999-2001 survey (Robison, 2001). In 2013, Fisheries Biologist Mitzi Cole collected shiners in Williams Creeks. The peppered shiner has been found in streams within or near the Caddo/Womble Ranger District.

Stargazing Darter *(Percina uranidea)* **Sensitive**

This species has a disjunct distribution in Arkansas almost identical to that of the saddleback darter (*P. ouachitae*) with which is usually occurs. It has been found in the White, Strawberry, Spring and Current revers in northeastern Arkansas. It also occurs in the eastern Saline and Ouachita rivers in southern Arkansas.

The stargazing darter is found in moderate sized rivers in swift current of deep riffles having gravel bottoms. It prefers clear water and is intolerant of silt. Its range now lies within Arkansas,

unlike the closely related *P. ouachitae* which is more widely distributed outside the state. It has been extirpated in Illinois and Indiana. Arkansas, large populations still exist in the Current and eastern Saline rivers. The only two known location for this species was recorded in 1976 at the Clifton Camp and River Bluff Recreation Area.

Direct and Indirect Effects

No Action

This alternative would have no direct effects on PETS mussels and fish species. Stream sedimentation from proposed management actions would not occur; however, some existing sediment sources would not be remedied (areas of eroded soils, road repairs).

Proposed Action

Timber Management *(regeneration harvest (seed-tree, clearcut for shortleaf restoration) thinnings (precommercial, commercial, woodland), mechanical site preparation, chop/rip/hand plant shortleaf pine seedlings, mechanical timber stand improvement and midstory reduction)*

None of the proposed timber management activities are expected to have any direct or indirect effects on these aquatic species. These species and their habitats are currently protected by streamside management areas, as defined in the Revised Forest Plan (USDA Forest Service, 2005a).

Chemical Treatments *(chemical site preparation, chemical timber stand improvement and non-native invasive plant species control)*

Herbicide application and manual control methods for NNIS species would be allowed throughout the proposed activity area as needed for elimination/control of non-native invasive weeds. The Womble district is proposing the use of the following herbicide active ingredients for site preparation, seedling release and control of non-native invasive species: glyphosate, imazapic, imazapyr, picloram and triclopyr.

Direct and indirect effects to these aquatic species could occur as a result of contact with herbicide or with personnel conducting mechanical and chemical control activities but are not likely due to approximately 99% of NNIS treatments occurring outside streamside management area protection buffers (aquatic habitats) and following Revised Forest Plan design criteria.

Prescribed Burning *(fire restoration treatments and fuel reduction)*

Effects from prescribed fire would vary due to fire intensity, aspect, and slope and it would be expected that some degree of forest floor cover would be removed. Prescribed burns would occur over the majority of the analysis area sometime during the 10 years following implementation of the proposed project. No direct or indirect effects are not anticipated for these aquatic species as a result of the proposed prescribed fire activities. The proposed activities would not cause any impacts due to the guidelines within the MA9 of RLMP.

Road/Fireline Construction, Reconstruction, Decommission and Maintenance; Trail Relocation Treatments

Direct and indirect effects from proposed treatments would occur only at an adjacent to stream crossing and would be the same as those for fish passage restoration. Removal of vegetative cover and soil disturbance as roads/firelines/trails are established shaped and drainage structures installed would temporarily increase sedimentation, concentrate runoff, and potentially impact water quality, but failure to reconstruct some of these roads and to maintain other roads would have detrimental impacts. Also fireline construction and layout would take advantage of natural and manmade barriers (stream and roads) thus limiting the need to manually construct new lines. Fireline crossing intermittent and perennial stream corridors would be constructed using hand tools. Firelines would be water barred and seeded after construction to limit the potential for sediment runoff. The potential for sedimentation would be reduced by implementing Revised Forest Plan standards and guideline.

Pond Improvements

Wildlife ponds within the project area are meant to provide a source of water and habitat for non-fish species such as amphibians, reptiles, insects and other non-fish species. No direct or indirect impacts to these PETS aquatic species are anticipated.

Fish Passage Improvement

The proposed fish passage improvement would occur on two different stream crossings within the project area. Drainage structures would be replaced and/or modified on the downstream/upstream sides with large rock or cobble to allow for fish passage.

Direct and indirect impacts could occur during demolition and constructing by individuals being crushed or impacted and localized water quality degradation due to sedimentation/leachate but this would be a onetime short-term occurrence and the area of disturbance would be limited. In an effort to avoid impacts any work within the stream channel would take place during low flow periods and employ erosion/sediment control techniques such as; sediment screens, filters, seeding and mulching (etc.) to control sediment loss thus limiting potential for any impacts to downstream populations. Replacement or modification of structures will have the long-term benefit of improving/easing fish passage at the site and restoring barrier free migration upstream from increased stream flow capacity and lower water velocities for longer periods of time facilitating aquatic organism passage over a greater range of stream flows.

Wildlife Opening Construction/Improvement

Sites do not contain suitable habitat capable of supporting these aquatic species. No direct or indirect impacts to these aquatic species are anticipated.

Glade Restoration

No direct or indirect impacts on these aquatic species are anticipated because all proposed activities are located outside its suitable habitat.

Watershed Restoration

Proposed watershed restoration would be used to protect aquatic, wildlife, soil and water resources. Activities could have a direct effect on these species by individuals being crushed during restoration work were it to occur in the stream when these aquatic species are present but is unlikely due to the limited area of impact. All other proposed watershed restoration activities will have no direct effect. Indirect effects could occur from increased siltation during restoration activities, but would be a temporary disturbance and short in duration and not expected to pose an increased risk to these species. In an effort to avoid impacts all work within SMA would take place during low flow periods.

Nest Boxes Installation

Proposed treatments would have no direct or indirect impacts on aquatic species because all proposed treatment sites are located outside of suitable habitats.

No Herbicide

The effects of this alternative would be the same as the proposed action except the effects attributed to herbicide application would not occur.

Cumulative Effects

There are no past, present, or reasonably foreseeable future actions that would be additive to the effects of this project.

Monarch butterfly ***(Danaus plexippus)*** **Sensitive**

Monarch butterfly is a butterfly species of concern due to range-wide population declines and its apparent extirpation from large portions of its historical range (NatureServe 2018). The current range of this species includes essential overwintering areas in coastal California and the mountains of Mexico; and the summer range includes portions of the conterminous U.S. and the southern portions of all Canadian provinces bordering the U.S. where milkweeds occur (NatureServe 2018). Populations in south Florida and the Gulf Coast are non-migratory. The detailed distribution of this species on the Caddo-Womble Ranger District (CWRD) is unknown.

The North American populations (subspecies *plexippus*) are strongly migratory. By September most emerging eastern monarchs are reproductively inactive and attempt to migrate to Mexico for the winter (Center for Biological Diversity et al. 2014 and Flockhart et al. (2014). Brindza et al. (2008) estimates that about 1.1 million Monarchs were tagged in eastern North America from the 1992 through 2006 migration seasons, of which 12,000-14,000 (over 1%) were recovered in Mexico. Stable isotope analysis confirms that Monarchs from the U.S. accounted for about 60% of those that reached the overwintering region in Mexico in 1996 (Butler, 2014 and Flockhart et al., 2014), but less in more recent years. The eastern North American population overwinters almost entirely as reproductively inactive adults at high elevations within an area of less than 100 by 100 km in Mexico where they require a very narrow range of microclimatic conditions. Vidal and Rendon-Salinas (2014) found 19 overwintering sites that have been documented at least once in Mexico. The most recent observations indicate that only seven had any monarchs and

that 88% of individuals were concentrated in two colonies, which together occupied less than a hectare (Vidal and Rendon-Salinas 2014).

Habitat for monarchs is not well defined except for breeding (milkweeds) and overwintering seasons. The critical conservation feature for North American populations is the overwintering habitats, which are certain high altitude Mexican conifer forests or coastal California conifer or Eucalyptus groves as identified in literature. All migratory North American monarchs may overwinter in one of these two areas. Monarchs begin to arrive in the overwintering areas in about late October into December. They cluster in the high altitude fir trees and usually do not feed until early spring (late February), living off their lipid reserves. Monarchs need low temperatures to reduce metabolic rate, but adults are not highly freeze-tolerant and sometimes depend on the dense forest canopy to moderate temperature and to provide shelter to keep dry. The freezing point and lethal temperature of a dry Monarch is -7.7°C (18F) and for a wet one about -4.2°C (24°F), (Nail and Oberhauser, 2012). Dormant Monarchs can survive high, cold places for up to five months. Reproductively active Monarchs live about 2-5 weeks.

Overwintering Monarchs may fly on sunny days, however such flights take an unknown toll on their reserves (Vidal and Rendon-Salinas 2014), which they may be able to replace by feeding in early spring. Those that survive the winter in the Mexican mountains mate, lay eggs, and fly north around March, but few survive past Texas. Stable isotope analysis confirms that most Monarchs reaching the U.S. Midwest in late spring originate from larvae in Texas, but a few females from Mexico reach farther north or east. Monarchs breed in Florida, Mississippi, Alabama and Georgia in spring and early summer but their offspring migrate north. No monarchs have been found to originate from these states that migrate to Mexico (NatureServe 2018). Breeding habitat for monarch is mostly patches of milkweed. Monarchs begin reaching their breeding range in April and May, when milkweed foliage becomes available, since larval food plants are milkweeds (NatureServe 2018). A few east coast Monarchs continue south and reach places such as southern Florida, Cuba, other Carribean Islands, and the Yucatan, where they apparently merge into resident non-migratory populations (Zhan et al., 2014). They do not return north and die within a month, however many successfully reproduce. Surveys by district wildlife biologist found no new locations of milkweed species within the project area.

Direct and Indirect Effects

No Action

This alternative would have no direct effect on Monarch butterfly. Indirect effects would include the natural succession of early seral habitats into mature forest. This process could result in an overall decline of their host plant (milkweed) some woody shrubs, and annual and perennial broadleaf herbaceous plant species, that provide shelter and food sources for this species. Without the continued presence of early seral stage habitats this species population would be expected to decline.

Proposed Action

All proposed activities would create some disturbance to the understory vegetation and could result in temporary loss of some woody shrubs, annual and perennial broadleaf herbaceous plant species that provide shelter and food sources for this butterfly species. While some butterfly

habitats may be impacted by the treatment activities, maintaining of expanding suitable habitat would be beneficial for the species in the long-term.

Timber Management *(regeneration harvest (seed-tree, clearcut for shortleaf restoration) thinnings (precommercial, commercial, woodland), mechanical site preparation, chop/rip/hand plant shortleaf pine seedlings, mechanical timber stand improvement and midstory reduction)*

Adult butterflies are highly mobile and it is unlikely that they would be directly affected by timber management actions. However, there is the possibility of harm to eggs and larvae if trees are felled or equipment impact eggs and larva on their host plant (milkweeds) and nectar producers. Although timber management activities may directly affect eggs and larvae of butterflies, these same actions would also allow for increases in new milkweed plants and herbaceous plant growth which may contain high quality nectar producers beneficial for this butterfly species.

All actions would create some disturbance to the understory vegetation and could result in the temporary loss of some woody shrubs, and annual, and perennial broadleaf herbaceous plant species that provide shelter and food sources for this butterfly species. While some butterfly habitats may be impacted by the treatment activities, maintaining or expanding suitable habitat would be beneficial for this species in the long-term.

Chemical Treatments *(chemical site preparation, chemical timber stand improvement and non-native invasive plant species control)*

Given the great diversity of species of terrestrial invertebrates, the use of data from a single species (Bee-Apis mollifera) for the risk characterization leads to uncertainty in the risk assessment. However, given the preponderance of scientific studies available, this information is applicable and represents the best science resource to date.

Bioassay studies of the listed chemicals proposed for use in the project area all exhibit very low toxicity to invertebrate species (bees). These determinations were based on concentrations of herbicides applied to bees that would far exceed concentrations applied in field treatment applications. Given the low risk of toxicity exhibited in invertebrate testing, no direct impact to Monarch's is anticipated. Indirect effects of herbicide application would most likely come in the temporary loss of some woody shrubs, annual and perennial broadleaf herbaceous plant species that provide shelter and food sources for this butterfly species. While some butterfly habitats may be impacted by the treatment activities, maintaining or expanding suitable habitat would be beneficial for the species in the long-term. The table below lists the toxicity ratings of proposed herbicide active ingredients on terrestrial invertebrate species (bee).

SUMMARY OF LD_{50} VALUES FOR BEE (TABLE XX)

Active Ingredient	LD_{50}*	Toxicity Risk to Bee	Risk Assessment
Glyphosate	>100 µg/bee	Relatively Nontoxic	Syracuse Environmental Research Associates, Inc. 2011a
Imazapic	No LD50 stated		Syracuse Environmental Research Associates, Inc. 2004a
Imazapyr	>100 µg/bee	Relatively Nontoxic	Syracuse Environmental Research Associates, Inc. 2011b
Picloram	>100 µg a.i./bee	Relatively Nontoxic	Syracuse Environmental Research Associates, Inc. 2011c
Triclopyr	>72 µg/bee	Nontoxic	Syracuse Environmental Research Associates, Inc. 2011d

LD50*- lethal dose for 50% of population tested

Prescribed Burning *(fire restoration treatments and fuel reduction)*

Adult Monarch butterflies are naturally adept at avoiding natural and prescribed fires, therefore no direct impacts are anticipated. There is the possibility that prescribed burning may directly kill eggs and larvae over-wintering on the host plant. However, prescribed burning benefits should far outweigh the onetime loss of eggs and larvae by enhancing and expanding the acres of suitable foraging and egg laying habitat throughout the watershed. Indirect effects of proposed burning would enhance and increase in acres of suitable foraging and egg laying habitat.

Road/Fireline Construction, Reconstruction, Decommission and Maintenance; Trail Relocation Treatments

Since adult butterflies are highly mobile it is extremely unlikely that they would be directly affected by road/fireline/trail construction, reconstruction, decommission, maintenance and relocation treatments. However, there is the possibility of crushing eggs and larvae with heavy equipment. Although proposed activities may have direct negative effects on eggs and larvae of butterflies, these same actions would also allow for increases in new milkweeds and herbaceous plant growth which may contain high quality nectar producers beneficial for this butterfly species.

All proposed actions would create some disturbance to the understory vegetation and could result in the temporary loss of some woody shrubs, annual and perennial broadleaf herbaceous plants species that provide shelter and food sources for this butterfly species. While some butterfly habitats may be negatively impacted by the treatment activities, maintaining or expanding suitable habitat would be “beneficial” for the species in the long-term.

Pond Improvements

No direct are anticipated as a result of improving ponds in the project area. Indirect effects may include herbaceous vegetation around the pond being disturbed during restoration which could cause a small temporary interruption in the butterflies’ habitat.

Wildlife Opening Improvement

Wildlife opening improvements would not impact adults of this species directly since they are highly mobile. However, the possibility of improvements may directly impact eggs and larvae if in leaf litter. Indirect effects would be positive by providing habitat for plant species that is used

by this butterfly and should outweigh the loss of eggs and larvae by enhancing suitable foraging and egg laying habitat.

Glade Restoration

No direct or indirect impacts are anticipated as a result of glade restoration within the project area.

Nest Boxes Installation

No direct or indirect impacts are anticipated as a result of placing roosting or nest boxes within that project area. Placement would require minimal ground disturbance if any and would not result in the loss of vegetation upon which this species is dependent.

Watershed Restoration

Watershed restoration would be used to protect wildlife, soil and water resources. No direct impacts to this butterfly are anticipated since action would be close to currently open/closed roads and trails, reassign designation of existing roads and improve impacted areas. However, there is the possibility of harm to eggs and larvae if equipment impacts eggs and larva in the leaf litter. It is likely the proposed actions would indirectly benefit butterflies by allowing the areas to revegetate thus providing potential foraging habitat.

No Herbicide

The effects of this alternative would be the same as the proposed action except the effects attributed to herbicide application would not occur.

Cumulative Effects

There are no past, present, or reasonably foreseeable future actions that would be additive to the effects of this project.

Plants Preferring Moderate Disturbance: Waterfall's sedge *(Carex latebracteata)*; **Ozark chinquapin** *(Castanea pumila var. ozarkesis)*

Waterfall's sedge *(Carex latebracteata)* **Sensitive**

Waterfall's sedge is endemic to the Ouachita Mountains of southeastern Oklahoma and southwestern Arkansas. It is known from over several hundred sites in Arkansas, most of which are near or on the Ouachita National Forest. Waterfall's sedge is locally abundant along the stream systems of the Ouachita Mountains in Arkansas and Oklahoma. It is found in Polk, Yell, Montgomery, Howard, Garland, and Pike counties in Arkansas and LeFlore and McCurtain counties in Oklahoma.

Waterfall's sedge is found in a variety of habitats such as shaley roadsides, dry shale woodlands, riparian areas, mesic oak hickory forest, pine and pine hardwood forest, Mazarn shale and novaculite glades.

Waterfall's sedge receives some natural protection from human disturbance by the diversity of its preferred habitats, as described above. Many of the locations on the Ouachita National Forest are on sites that are outside the normal operating limits of common land management activities. Several of these locations are protected from many habitat-altering activities by virtue of being within the glade and riparian communities, Wilderness Areas, and Research Natural Areas which are protected under the Forest Plan (USDA FS 2005a).

Ozark chinquapin *(Castanea pumila var. ozarkesis)* **Sensitive**

Ozark chinquapin is imperiled throughout its entire range due to the species complete infestation with chestnut blight. Despite its status, it is both abundant and widespread throughout the Interior Highlands. It is found in both successional and old growth vegetation types. It commonly occurs in dry deciduous and mixed hardwood pine communities on rocky dry slopes and ridge tops. Due to the chestnut blight infestation it now occurs largely as stump sprouts and it reaches its fastest growth rate where abundant sunlight reaches the forest floor. Ozark chinquapin is known to occur on the Caddo-Womble Ranger District. Surveys by district biologists and the Forest Botanist found no new location of Ozark chinquapin within the project area.

No Action

Waterfall's sedge grows in a wide variety of habitats; populations would be expected to remain viable and stable under this alternative. Ozark chinquapin occur entirely as stump sprouts due to chestnut blight, a condition in which it has persisted for decades. Individual plants within the project area would be expected to remain stable as long as stumps continue to persist. No direct or indirect effects are anticipated from this alternative.

Proposed Action

Timber Management *(regeneration harvest (seed-tree, clearcut for shortleaf restoration) thinnings (precommercial, commercial, woodland), mechanical site preparation, chop/rip/hand plant shortleaf pine seedlings, mechanical timber stand improvement and midstory reduction)*

Waterfall's sedge have responded well to moderate levels of disturbance. Although it is likely

that vegetative portions of individual plants might be directly impacted by felling timber and timber removal, this disturbance should not pose a risk to local populations. Regeneration cuts would directly impact this species by being out-competed in an open canopy. Thinning of timber stands often indirectly improves habitat conditions by allowing more sunlight to reach the forest floor (increasing growth potential and seed production) and by providing areas of disturbed soil for dispersal of seeds and development of new growth. Individual plants may be damaged or even uprooted during timber harvest and planting but overall habitat conditions should improve as a result of the proposed actions.

Timber management actions are proposed for upland shortleaf pine, pine/hardwood and hardwood stands that may support habitat conditions conducive to Ozark chinquapin. These activities may damage or uproot trees. Field surveys found no new locations of Ozark chinquapin; known and any newly-found locations would be flagged and protected from proposed timber management activities in that area.

Chemical Treatments *(chemical site preparation, chemical timber stand improvement and non-native invasive plant species control)*

Target areas for most herbicide application would occur in areas that are suffocated with invasive plants and along roadsides; it is possible that these treatments could occur in MA 6 – Rare Upland Communities. Herbicide application methods, including direct application to target foliage or to freshly cut stumps/surfaces, would minimize the possibility of direct contamination to non-target species. Effects to sensitive plants would be further minimized because 1) the use of herbicides is prohibited when weather conditions exceed the threshold for use that could cause drift (Revised Forest Plan, HU015, Table 3.8, pp. 88-89) and 2) locations of these sensitive plants within the project area are documented. The greatest threat to glade species, like waterfall's sedge, is habitat loss due to the encroachment of woody and non-native invasive herbaceous species into open glade areas. The herbicide application to invasive vegetative species and the removal of woody species would improve habitat quality by increasing light to the forest floor, decreasing competition.

Direct effects to Ozark chinquapin are unlikely due to no new locations or occurrence in areas where most applications of herbicide would occur. This tree's physical form is easily recognized allowing avoidance in know location planned for invasive species control by mechanical and herbicide application. The Revised Forest Plan (TE008, p. 77) states, "Herbicides will not be applied to Ozark chinquapin, and stems of this species will be individually flagged or otherwise marked in the field by qualified personnel prior to herbicide application within the stand. Use of soil active, mobile herbicides should not be applied where they might move to the root system of this species" (USDA-Forest Service 2005a). If foliar application is used, a buffer of 30 feet would be required if trees are found and flagged in an application area. When Chinquapins respond well to an increased level of light and a reduction in competition for water, space, and nutrients when competing vegetation is reduced by herbicide.

Prescribed Burning *(fire restoration treatments and fuel reduction)*

Vegetative portion of plants and some seed loss would likely occur to both Waterfall's sedge and Ozark chinquapin depending on intensity and duration of burn events. Some individual Ozark chinquapins may be set back by being burned but they would be expected to re-sprout from their

stumps. It is likely that Waterfall's sedge would benefit indirectly from burning due to reduced competition and their ability to tolerate moderate soil disturbance. Loss of the natural fire regime has led to successional change that has negatively affected regeneration and growth in chinquapin (NatureServe 2016). Prescribed burning would help reduce understory competition, providing long-term opportunities for individual plants to grow, and would attempt to restore the fire regime.

Road/Fireline Construction, Reconstruction, Decommission and Maintenance; Trail Relocation Treatments

Road/fireline/trail construction, reconstruction, decommission, maintenance and relocation may be detrimental to these species by uprooting individual plants. Uprooting of Ozark chinquapin and Waterfall's sedge would result in the permanent loss of that individual plant. Waterfall's sedge could recolonize areas of temporary roads and firelines in disturbed areas; therefore any direct effects should not be permanent. Habitat on open roads would be eliminated into the future for each species. Any soil disturbance from construction/ reconstruction should be temporary.

Pond Improvements

The proposed activities would occur outside of habitats preferred by these plants species, no direct or indirect impact are anticipated.

Wildlife Opening Improvement

No direct or indirect impacts are anticipated for these plant species.

Glade Restoration

Direct and indirect effects would be the same as timber and prescribed burning treatments.

Nest Boxes Installation

The proposed activities would occur outside of habitats preferred by these plants species; no direct or indirect impacts are anticipated.

Watershed Restoration

Proposed watershed restoration treatments would be used to protect wildlife, soil and water resources. No direct impacts are anticipated since the majority of sites do not contain suitable habitat due to impacts of overuse/compaction. It is possible that Waterfall's sedge would receive some indirect benefits from restoration activities since Waterfall's sedge can reestablish itself in areas with some soil disturbance.

No Herbicide

The effects of this alternative would be the same as the proposed action except the effects attributed to herbicide application would not occur.

Cumulative Effects

There are no past, present, or reasonably foreseeable future actions that would be additive to the effects of this project.

Sensitive Plant Species of Streamside Management Areas

Plants of Streamside Management Areas: Southern lady's slipper *(Cypripedium kentuckiense)*; **Ouachita false indigo** *(Amorpha ouachitensis);* **Narrowleaf ironweed** *(Vernonia lettermanii)*

Southern lady's slipper *(Cypripedium kentuckiense)* **Sensitive**

This orchid occurs within the Interior Highlands of Arkansas, Missouri, and Oklahoma, the Gulf Coastal Plain of Texas, Louisiana, Alabama, and Mississippi, and the Cumberland Plateau of Kentucky and northern Tennessee (NatureServe, 2015). It has also recently been found in eastern Virginia. The Southern lady's slipper is common in the state of Arkansas. It is less common in Oklahoma, the western extent of its range. The habitat for this species can be described as mesic floodplain forest along stream terraces and along margins of seeps and springs. These areas are often inundated annually and have a complete canopy. It is most abundant above the flood level and away from spring-saturated soils. It is one of the most common and widespread sensitive plant species on the Ouachita National Forest.

Protective measures established under the LRMP (USDA FS 2005a) and FEIS (USDA FS 2005b) to ensure the integrity of streamside management areas and seeps/springs have greatly reduced the potential for impacts to this species during resource management activities. Construction/soil disturbance in these areas would be the greatest threat to this species.

Ouachita false indigo *(Amorpha ouachitensis)* **Sensitive**

The Ouachita false indigo is endemic to the Ouachita Mouontains of west central Arkansas and southeast Oklahoma; Leflore, McCurtain, Pushmatana Counties, Oklahoma; Conway, Garland, Logan, Montgomery, and Polk Counties, Arkansas. Their habitat consist of clearings of rocky creeks and backs of streams, rocky ridges, glades; dry rocky sandstone slopes.

Narrowleaf ironweed *(Vernonia lettermanii)* **Sensitive**

This species is known from western Arkansas and eastern Oklahoma. It occurs on gravel bars and rock ledges along fifth order streams within the Ouachita, Cossatot, Fourche Lafave and Poteau drainages in Arkansas and the Mountain Fork drainage in Oklahoma. There are three locations in Oklahoma and 10 in Arkansas occurring on NF lands.

This species is protected through the implementation of ALRMP standards and guides for protection of SMZs. Burning should not have an effect on this species.

Direct and Indirect Effects

No Action

This alternative would allow natural processes to occur without human intervention. Only natural disturbances would cause changes to these species and their associated habitats, which are at the edges of streams, in seeps, wetlands and riparian areas. These changes would be expected to be within the normal range of habitat fluctuation that occurs naturally, and to which these species are adapted. No direct or indirect effects on these sensitive plant species would occur as a result of deferred management.

Proposed Action

Under the proposed activities, management actions would protect overall forest health and provide long-term, mesic, closed-canopy habitat in streamside management areas and seeps/springs preferred by these plants. Soil disturbance, heavy equipment operation, prescribed fire, creation/maintenance of early successional habitat, and sedimentation within the project area would largely occur outside of this species preferred habitat; therefore, any negative effects would be minimal.

Timber Management *(regeneration harvest (seed-tree, clearcut for shortleaf restoration) thinnings (precommercial, commercial, woodland), mechanical site preparation, chop/rip/hand plant shortleaf pine seedlings, mechanical timber stand improvement and midstory reduction)*

Timber management treatments are proposed for upland shortleaf pine, pine/hardwood and hardwood stands. These treatment areas only support habitat conditions for these sensitive species within streamside management areas and wetland communities such as seeps and springs, which are protected by Revised Forest Plan design criteria. The proposed timber management actions would have no impact on these sensitive plant species.

Chemical Treatments *(chemical site preparation, chemical timber stand improvement and non-native invasive plant species control)*

Target areas for most herbicide application would occur in areas that are suffocated with invasive plants and along roadsides; it is possible that these treatments could occur in MA 9 – Water and Riparian Communities. Herbicide application methods, including direct application to target foliage or to freshly cut stumps/surfaces, would minimize the possibility of direct contamination to non-target species. Effects to sensitive plants would be further minimized because 1) the use of herbicides is prohibited when weather conditions exceed the threshold for use that could cause drift (Revised Forest Plan, HU015, Table 3.8, pp. 88-89) and 2) locations of these sensitive plants within the project area are documented.

The riparian areas are being affected by invasive plants encroachment that could affect these sensitive species. The herbicide application to invasive species and the removal of woody species would improve habitat quality by decreasing competition, though some individual Southern lady's slipper, Ouachita false indigo and Narrowleaf ironweed plants could be damaged or killed during the herbicide treatment.

Prescribed Burning *(fire restoration treatments and fuel reduction)*

Prescribed burns would occur over the majority of the project area. Effects would vary due to fire intensity, aspect, and slope; it would be expected that some degree of the forest floor cover would be removed. Overall, prescribed fire is not likely to directly impact these species due to the wet habitat conditions in which they normally occur, and prescribed burning occurring during the plants' dormancy. Indirectly, plants may benefit post-burn due to reduced competition.

Road/Fireline Construction, Reconstruction, Decommission and Maintenance; Trail Relocation Treatments

Firelines used for prescribed burning would take advantage of existing natural barriers, such as existing roadways and streams, and hand lines would be utilized within streamside management areas, both limiting the amount of disturbance in preferred habitats. Reconstruction of system roads would occur in previously disturbed areas generally unsuitable to these sensitive plant species due to soil compaction. Direct or indirect effects are not anticipated because of the limited amount of disturbance to preferred habitats. If roads, firelines or trails are constructed in riparian areas, seeps and/or spring heads, the habitat could be altered and become unsuitable for these species.

Pond Improvements

No direct or indirect impacts are anticipated for these sensitive plant species.

Wildlife Opening Improvement

Examination of proposed sites for wildlife opening improvements found no occurrence of these sensitive plant species; no direct or indirect impacts are anticipated for these plant species.

Glade Restoration

Direct and indirect effects would be the same as timber and prescribed burning treatments.

Nest Boxes Installation

The proposed activities would occur outside of habitats preferred by these plants species, no direct or indirect impact are anticipated.

Watershed Restoration

Proposed soil stabilization and restoration would be used to protect wildlife, soil and water resources. No direct effects would occur to these sensitive plant species since botanical surveys found no occurrences, nor sites that support habitat conditions conducive to these sensitive plant species. The restoration sites do not contain suitable habitat for these sensitive plant species due

to impacts of overuse/compaction. Indirect effects anticipated from rehabilitation of these sites are reduced stream siltation, soil compaction and sedimentation. Potentially the watershed restoration work could restore these habitats making them again suitable for the sensitive plant species.

No Herbicide

The effects of this alternative would be the same as the proposed action except the effects attributed to herbicide application would not occur.

Cumulative Effects

There are no past, present, or reasonably foreseeable future actions that would be additive to the effects of this project.

Plant Species of Glades and similar habitat: Open-ground draba (*Draba aprica);* **Palmer's cornsalad** *(Valerianella palmeri);* **Nuttall's cornsalad** *(Valerianella nuttallii);* **Gulf pipewort** *(Eriocaulon koernickianum)*

Open-ground draba *(Draba aprica)* **Sensitive**

This species is found in the Ozark and Ouachita Mountains along shale, sandstone and limestone bluffs and glades. There are six locations within the Ouachita National Forest. They are located on or near the Oden (southern edge), Womble, and Jessieville and Winona Ranger Districts. Most populations of *Draba aprica* consist of one to several small patches of only a few square meters each. Those confined to a single patch generally consist of less than 100 plants.

Draba aprica is a winter anuual, which germinates in late fall and forms a basal rosette of leaves which over winters and sends up a flowering stem with the advent of warmer weather in early spring. There are drastic fluctuations in the populations of annuals species. This fluctuation makes it hard to monitor this species annually.

Generally, the soil in most places where *Draba aprica* grows is too thin to support a continuous cover of large trees, and it is exposed to at least partial sun. Since it is found in somewhat open areas, *Draba aprica* is well adapted to vegetation types that are successional in nature. This is due to the generally more open canopy and more frequent canopy gaps resulting from rapid tree death in these communities.

Population levels may fluctuate with the expansion and contraction of canopy cover. Thinning of the overstory trees is considered beneficial if done with care and during times when draba is dormant from June through October.

Palmer's cornsalad (*Valerianella palmeri*) **Sensitive**

This plant is an annual that inhabits a variety of sites such as gravelly areas near streams, rocky ledges in open woods and mesic oak woods. Effects to this species are similar to Nuttall's cornsalad.

Nuttall's cornsalad *(Valerianella nuttallii)* **Sensitive**

Nuttall's cornsalad is found in two district habitats, one is meadows and ditches with annuals and perennials including but not limited to downy wood mint (*Blephilia ciliata*), lance-leaved coreopsis (*Coreopsis lanceolata*), corn salad (*V. longiflora*), corn salad (*V. radiata*), and Queen Anne's lace (*Daucus carota*). Another habitat is in open areas within shale glades. This species is an annual and prefers areas where vegetation competition is low. Since this species is found in meadows and in roadside ditches, it can withstand some disturbance.

This species is apparently restricted to western Arkansas. It was formerly reported in eastern Oklahoma, but occurrences have not been confirmed there recently. This species is found in Garland, Hot Springs, Logan, Montgomery and Polk counties in Arkansas.

Gulf pipewort (*Eriocaulon koernickianum)* **Sensitive**

This species in the western part of its range (Arkansas, Oklahoma, and Texas) it is found in small microhabitats in or near permanently moist to wet seepage areas (particularly upland sandstone glade seeps), bogs, and prairie streambanks. There is only one location on the Ouachita NF and that is on the Fulton Branch Glades on the Womble RD.

It is a perennial herb with a leafless flowering stem, 5-8 cm tall, arising from a tuft of grass-like leaves. Each stem bears a dense, globular cluster of gray-green flowers at its tip.

It is intolerant of shade and is associated with an open vegetation type of low stature with woody plants being absent from the immediate area. Removal of the overstory could promote species viability so long as ground disturbance does not occur in the immediate area of the plants.

Kral (1983) wrote, "Prescription burns on typical site would be difficult if not impossible. Therefore, this management practice for the most part does not apply to this species." Tucker (1991) reports two locations on the Ozark NF where fire had obviously passed through the sites. Low intensity dormant season fires may promote species viability.

Direct and Indirect Effects

No Action

Under this alternative, natural processes would occur without human intervention. Only natural disturbances would cause changes to this sensitive plant species and their associated mesic woodland and similar habitats. These changes would be expected to be within normal range of habitat fluctuation that occur naturally, and to which these species are adapted. No direct or indirect effects are anticipated on this plant species as a result of deferred management.

Proposed Action

Timber Management *(regeneration harvest (seed-tree, clearcut for shortleaf restoration) thinnings (precommercial, commercial, woodland), mechanical site preparation, chop/rip/hand plant shortleaf pine seedlings, mechanical timber stand improvement and midstory reduction)*

The Revised Forest Plan, specifically the standards for MA 6, provides protection for rare upland communities where these plant species may occur. These standards would protect nearly all of the habitats associated with these sensitive plant species. Timber harvest may occur on the outside of these sensitive species habitat and they may directly affect individuals, though when possible tree will be removed and carried to the landing without skidding along the ground. Sites appropriate for these plant species are generally on shallow soils and is unsuitable for timber production.

Chemical Treatments *(chemical site preparation, chemical timber stand improvement and non-native invasive plant species control)*

Botanical field surveys of the proposed treatment areas found no occurrence of these sensitive plant species. No direct or indirect impacts are anticipated. If they were to occur within suitable habitat in NNIS treatment areas, it is possible that vegetative portions of individual plants might be directly impacted by herbicide application or manual treatment methods for NNIS control but effects are expected to be limited. All herbicide application for NNIS control would be applied directly to individual stems and at the lowest application levels necessary. It is more likely that these sensitive plant species would indirectly benefit from proposed treatments in that competing vegetation would be eliminated or suppressed allowing opportunities for seeding and new growth. As part of implementation, each site proposed for treatment would be evaluated for the presence of populations or of habitat for PETS species and for determining the best treatment method and timing.

Prescribed Burning *(fire restoration treatments and fuel reduction)*

There would be a direct effect on exiting plans if burning was performed during a growing season and individual plants were top-killed. Since glade species occur in shallow soils and on generally bare ground where there is very little competition, the prescribed fire might burn around plant clusters. Indirectly prescribed fire will open the canopy and reduce vegetative competition, thus improving habitat for these species.

Road/Fireline Construction, Reconstruction, Decommission and Maintenance; Trail Relocation Treatments

Firelines used for prescribed burning would take advantage of existing natural barriers such as existing roadways and streams and utilizing hand lines within streamside management areas limiting the amount of disturbance in preferred habitats. Reconstruction of system roads would occur in previously disturbed areas generally unsuitable to these sensitive plant species due to soil compaction. Direct or indirect effects are not anticipated because of the limited amount of disturbance to preferred habitats.

Pond Improvements

No direct or indirect impacts are anticipated for these sensitive plant species.

Wildlife Opening Construction/Improvement

Examination of proposed future sites for wildlife openings found no occurrence of these sensitive plant species. Therefore no direct or indirect impacts are anticipated for these plant species.

Glade Restoration

Direct and indirect effects would be the same as timber, prescribed burning and chemical treatments except in the glade restoration would benefit these species by reducing competition which would allow these species the opportunity for seeding and new growth.

Nest Boxes Installation

The proposed activities would occur outside of habitats preferred by this plants species, no direct or indirect impact are anticipated.

Watershed Restoration

Proposed soil stabilization and restoration would be used to protect wildlife, soil and water resources. No direct effects would occur to this sensitive plant species since botanical surveys found, no occurrences, nor sites that support habitat conditions conducive to this sensitive plant species. The restoration sites do not contain suitable habitat for this sensitive plant species due to impacts of over use. Indirect effects anticipated from rehabilitation of these sensitive plant species habitats are reduced stream siltation, soil compaction and sedimentation.

No Herbicide

The effects of this alternative would be the same as the proposed action except the effects attributed to herbicide application would not occur.

Cumulative Effects

There are no past, present, or reasonably foreseeable future actions that would be additive to the effects of this project.

Local Economy & Financial Efficiency

Present Conditions

The Fulton Branch Project is located in Montgomery County. As of 2016, the population of this county was 8,879 (Headwaters Economics, 2018).

The following table displays the percentage of each county's land base occupied by National Forest System lands. It also displays employment in commodity sectors of the economy that have the potential to use federal public lands, as well as employment in travel and tourism sectors that provides goods and services to forest visitors (Headwaters Economics, 2018).

NFS LAND BASE AND RELATED JOBS OF COUNTY REGION (TABLE 3.15)

Indicators	Geography	
	Montgomery	County Region
% Land Base		
NFS Lands	65.9	28.2
% Total Jobs		
Timber	2.6	7.6
Mining[1]	2.8	0.5
Agriculture	15.6	9.3
Travel & Tourism	33.5	12.0

1-Unrelated to fossil fuels

No Action

Direct, Indirect and Cumulative Effects

There would be no effects on the local economy from not implementing the proposed actions. Ongoing Forest Service contracts located within the project counties would continue to provide jobs and revenue to local communities and businesses.

Proposed Action and No Herbicide

Direct, Indirect and Cumulative Effects

Many management actions are performed by contractors (site preparation, stand improvement, timber sale layout etc.). These activities would provide jobs to the local community and create a stream of revenue to local businesses. These effects would be additive to ongoing Forest Service contracts located within the project counties.

Project Financial Efficiency

Under the Proposed Action and the No Herbicide Alternative there would be both costs and revenues associated with the sale of timber. Costs include activities that are directly associated with timber management (site preparation, timber sale administration, etc.). Revenues are generated from the sale of timber. A computer program called Quick Silver version 7.0 was used to evaluate the financial efficiency of each alternative; these results are displayed in the table below.

ALTERNATIVE COMPARISON BY FINANCIAL EFFICIENCY (TABLE 3.16)

Financial Indicator	No Action $	Proposed Action $	No Herbicide $
Present Value of Revenues[1]	0	1,350,423	1,350,423
Present Value of Costs[2]	0	(518,048)	(537,402)
Present Net Value[3]	0	832,375	813,021
Revenue/Cost Ratio[4]	N/A	2.6	2.5

1- Present Value of Revenues – The sum of all revenues discounted at some interest rate.
2- Present Value of Costs – The sum of all costs discounted at some interest rate.
3- Net Present Value – The sum of the present value of the revenues minus the sum of the present value of the costs.
4- Revenue/Cost Ratio – Present value of revenues divided by the present value of costs.

The Revenue/Cost Ratio is highest for the Proposed Action. Two seedling release treatments would be expected under the No Herbicide Alternative.

Public Health & Safety

Present Conditions

Refer to the present conditions described in the Air Quality section and the Water Resources & Quality section of this chapter.

No Action

Direct and Indirect Effects

The prescribed burning and the application of herbicides would not take place under this alternative; there would be no effect to public health and safety specific to these activities.

Cumulative effects

There are no actions proposed under this alternative, so there would be no cumulative effects on this resource.

Proposed Action

Direct and Indirect Effects

Refer to the Air Quality section of this chapter for disclosure of effects on public health and safety from prescribed burning.

Accidents or other unforeseen events might occur during herbicide transportation, mixing, and application. Public safety in and around areas of herbicide use is a high priority concern. Measures are taken to help ensure that the general public does not come in contact with herbicides, which would eliminate the risk entirely. These include posting warning signs on areas that have been treated; selectively targeting vegetation that needs to be controlled rather than using broadcast application; establishing buffer zones of non-treatment around private property, streams, roads, and hiking trails; carefully transporting only enough herbicide for one day's use; mixing it on site away from private land, open water, or other sensitive areas; properly maintaining and operating equipment (e.g. no leaks); and having good accident pre-planning and emergency spill plans in place. Enforcement and administration will be effective in reducing the risk of accidental contamination to humans or the environment. In the event of an accidental spill, the Emergency Spill Plan (Forest Service Manual 2109 Chapter 30) would be followed. The Plan contains procedures for spill containment and cordoning-off of the spill area. These measures along with others given in the Revised Forest Plan are incorporated into contracts and through good enforcement and administration would be effective in reducing the risk of accidental contamination of humans or the environment.

Herbicide applications were monitored for effectiveness in protecting water quality over a five-year period on the Ouachita NF (Clingenpeel, 1993). The objective was to determine if herbicides are present in water in high enough quantities to pose a threat to human health or aquatic organisms. From 1989 through 1993, 168 sites and 348 water samples were analyzed for the presence of herbicides. Of those samples, 69 had detectable levels of herbicide. No

concentrations were detected that would pose a significant threat to human health or aquatic organisms.

Syracuse Environmental Research Associates Incorporated (SERA) Human Health and Ecological Risk Assessments were used to analyze the risks associated with the herbicides proposed for treatment. Site-specific risk assessments developed by SERA have been conducted for this project as required by the Revised Forest Plan (p. 87, HU002) and are located in the project file.

Estimates of risk are presented in terms of a hazard quotient (HQ). An HQ is the quotient of an estimate of exposure divided by the appropriate toxicity value. Concern for the development of adverse effects increases as the value of the HQ increases.

Glyphosate may be used at an application rate of 2 lbs/acre. It would generally be applied as a foliar application to weeds and woody brush. Hazard quotients are at acceptable levels (less than 1) for all exposure scenarios except for the following: water consumption by a child after an accidental spill, and consumption of contaminated vegetation by an adult female.

Imazapic may be used at an application rate of 0.188 lb/acre. It would generally be applied as a foliar application to weeds. Hazard quotients are at acceptable levels (less than 1) for all exposure scenarios except for water consumption by a child after an accidental spill.

Imazapyr may be used at an application rate of 1.5 lb/acre. It would generally be applied as a foliar application to weeds and brush species. At this rate, the risk assessments indicate the use of imazapyr does not pose any identifiable hazard to workers or the general public in Forest Service applications. Hazard quotients are at acceptable levels (less than 1) for all exposure scenarios.

Picloram may be used at an application rate of 1.0 lb/acre as a foliar spray; it may only be used to control kudzu. For workers, hazard quotients are below a level of concern (less than 1) for all exposure scenarios. For members of the general public, hazard quotients are at acceptable levels (less than 1) for all exposure scenarios except for the following: water consumption by a child after an accidental spill, and consumption of contaminated vegetation by an adult female.

Triclopyr triethylamine (salt) may be applied at a rate of 4 lbs/acre for cut-surface treatments; triclopyr butoxyethyl (ester) may be applied at a rate of 2 lbs/acre for foliar spray. Triclopyr is used to control herbaceous and woody broadleaf weeds.

At the central and upper bounds of the estimated exposures for workers using a backpack sprayer application method, the hazard quotients for both triclopyr amine and triclopyr ester formulations exceed the level of concern, ranging from 1 to 12. The level of concern is also exceeded for accidental exposure to contaminated gloves for one hour at the central and upper bounds of exposure to triclopyr ester.

For the general public, several exposure scenarios exceed the level of concern. Hazard quotients for direct spray of a child's whole body and direct spray to the feet and lower legs of an adult

female range from 1.4 to 3. For an adult female consuming contaminated vegetation, the upper bound HQ is 108 for acute exposures and 26 for longer-term exposures. In addition, some of the central estimates of exposure to triclopyr involving a young woman consuming contaminated vegetation or fruit also exceed the level of concern. Because triclopyr has been shown to cause adverse developmental effects in mammals, high HQs associated with terrestrial applications are of particular concern in terms of the potential for adverse reproductive outcomes in humans. Adverse developmental effects in experimental mammals have been observed, however, only at doses that cause frank signs of maternal toxicity. The available toxicity studies suggest that overt and severe toxicity would not be associated with any of the HQs and this diminishes concern for reproductive effects in humans (SERA, 2011d).

Cumulative Effects

There are no other past, present or reasonably foreseeable future applications of herbicide within the project vicinity that would be additive to the effects of this project.

No Herbicide Use

Refer to the Air Quality section of this chapter for disclosure of direct, indirect, and cumulative effects on public health and safety from prescribed burning.

Since no herbicides would be utilized under this alternative, there would be no direct, indirect, or cumulative effects on public health and safety resulting from herbicide use.

Recreation, Scenic Resource, Wild & Scenic Rivers, Inventoried Roadless Areas, Wilderness

Present Conditions

The main recreation uses in the area are mountain biking, hiking, camping, canoeing, hunting and fishing. The northern boundary is the Ouachita River. The Ouachita is an eligible Wild & Scenic River, with this section classified as Scenic. Scenic river areas are defined as "those rivers or sections of the rivers that are free of impoundments with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads". The project area contains 3 designated recreation areas and 10 ½ miles of the Womble Trail. There are no inventoried roadless areas, or wilderness in the project area.

Scenic Integrity Objective (SIO) levels, referring to the degree of acceptable alterations to landscape character, are assigned in the project area as very high (15%), high (61%), medium (21%), and low (3%). The Ouachita River Wild and Scenic River Corridor is assigned the very high SIO. The Southern Region's Scenery Treatment Guide (April, 2008) would inform design criteria applied for management actions within various SIOs.

No Action

Direct and Indirect Effects

No management actions are proposed; this alternative would not alter scenic integrity. Changes in the landscape would continue to appear natural to the observer. There would be no effects on recreational users.

Cumulative effects

There are no actions proposed under this alternative, so there would be no cumulative effects on this resource.

Proposed Action

Direct and Indirect Effects

Immediate effects to the recreation resource would include a disturbance in the recreation experience by the sights, sounds, and smells of management activities such as logging operations and prescribed burning. Noise from logging and road construction, as well as increased dust, would be a temporary disturbance while management activities are being performed. Regeneration harvests, glade restoration, and thinning operations could result in increased wildlife viewing and hunting opportunities.

Proposed modified seed tree regeneration harvests would reduce the stand basal area and create a visible linear edge along the surrounding forest. The number of trees removed from a typical thinning usually creates a minimal change in the forest form. Few, if any, linear edges occur. Pine needles in slash turn a distinctive red-orange color and the wood becomes gray. Hardwood slash does not change color, but tends to be noticeable in early spring and in late fall. Understory vegetation helps screen slash from view.

Proposed site preparation would result in a loss of midstory and understory vegetative screening, and produce slash on the forest floor. Because these activities target hardwoods, a loss of spring and fall colors would be evident. Although the application of herbicides may coincide with the seasonal browning of leaves in autumn, standing dead vegetation may be evident for two or three years after application.

Changes in color and texture would result from exposed soil in roads, skid trails, and firelines. Prescribed fires that burn along the ground tends to create short-term color changes. Prescribed burning would temporarily reduce the amount of understory vegetation, allowing for greater viewing depth into the forest. Burning would create a charred appearance on tree trunks and the forest floor. These effects would diminish in three to six months due to regrowth of vegetation on the forest floor, as well as natural leaf shedding. The landscape would regenerate within one to two years following the disturbance, allowing greening-up and limiting far distant views into the landscape.

During the construction of the trail relocation, equipment may be seen in the area and could cause noise and increased dust on the trail. Portions of the trail may need to be closed for public safety while the work is being completed.

Prescribed burning is proposed in the Ouachita Wild and Scenic River Corridor. As will all recreation in the project area, smoke from prescribed fire would negatively impact river users. As described earlier, visual effects would be transitory. During the burns roads may be closed for public safety making it difficult for river users to get to the river. No effects to wilderness are anticipated due to its location outside of the project area.

While short-term adverse effects on scenic integrity would occur as a consequence of the above-described activities, the overall long-term effect of the proposed management activities on scenic integrity would be beneficial. This is because proposed management would improve the health and integrity of forest stands. Thinning of the midstory and overstory would allow more light to reach the forest floor, causing more diverse species of plants coming up in the understory creating a more park-like setting. This new growth of plants would attract animals and pollinators, enhancing the visual experience for users of the river. Overall, this alternative would reduce the long-term impacts on scenic resources.

Cumulative effects

There are no past, present, or reasonably foreseeable future actions that would be additive to the effects of this project.

No Herbicide Use

The effects of this alternative would be the same as those attributed to the Proposed Action above, except the listed effects from herbicide would not occur.

Climate Change

Effects of proposed actions on climate change

Forests play a major role in the global carbon cycle by storing carbon in live plant biomass (approximately 50% of dry plant biomass is carbon), in dead plant material and in soils. Forests contain three-fourths of all plant biomass on earth, and nearly half of all soil carbon. The amount stored represents the balance between absorbing CO_2 from the atmosphere in the process of photosynthesis and releasing carbon into the atmosphere through live plant respiration, decomposition of dead organic matter, and burning of biomass (Krankina & Harmon, 2006).

Through the process of photosynthesis, carbon is removed from the atmospheric pool. About half the carbon absorbed through photosynthesis is later released by plants through respiration as they use their own energy to grow. The rest is either stored in the plant, transferred to the soil where it may persist for a very long time in the form of organic matter, or transported through the food chain to support other forms of terrestrial life. When plants die and decompose, or when biomass or its ancient remains in the form of fossil fuels are burned, the original captured and stored carbon is released back to the atmosphere as CO_2 and other carbon-based gases. In addition, when forests or other terrestrial ecosystems are disturbed through harvesting, conversion, or natural events such as fires, some of the carbon stored in the soils and organic

matter, such as stumps, snags, and slash, is oxidized and released back to the atmospheric pool as CO_2. The amount released varies, depending on subsequent land use and probably rarely is more than 50% of the original soil store (Salwasser, 2006). As forests become older, the amount of carbon released through respiration and decay can exceed that taken up in photosynthesis, and the total accumulated carbon levels off. This situation becomes more likely as stands grow overly dense and lose vigor. Wildfires are the greatest cause of carbon release from forests. At the global scale, if more carbon is released than is captured and stored through photosynthesis or oceanic processes, the concentration of carbon dioxide (CO_2) builds in the atmospheric pool. However, the greatest changes in forest sequestration and storage over time have been due to changes in land use and land use cover, particularly from forest to agriculture and more recently changes are due to conversions from forest to urban development, dams, highways, and other infrastructure (Malmsheimer, Heffernan, & Brink, 2008).

No Action

Direct, Indirect and Cumulative Effects

The activities proposed during this entry would not occur; therefore no direct effects on greenhouse gases (GHG) emissions and carbon cycling would occur. Carbon would continue to be sequestered and stored in forest plants, trees, (biomass) and soil. There would be no cumulative effects under the no action alternative because no activities are proposed.

Proposed Action and No Herbicide

Direct and Indirect Effects

The proposed harvest operations would result in a release of carbon and reduce carbon storage in the forest both by removing organic matter (trees) and by increasing heterotrophic soil respiration. However, much of the carbon that is removed is offset by storage in forest products. Forest management that includes harvesting provides increased climate change mitigation benefits over time because wood-decay CO_2 emissions from wood products are delayed (Malmsheimer, Heffernan, & Brink, 2008). Prescribed burning activities, although a carbon neutral process, would release CO_2, other greenhouse gases, and particulates into the atmosphere. Indirectly, commercial thinning, which would reduce stand density, and regeneration harvests, which would result in younger forest, would reduce carbon accumulation in the atmosphere.

Cumulative Effects

As GHG emissions and carbon cycling are integrated across the global atmosphere, it is not possible to determine the cumulative impact on global climate from emissions associated with this project or any number of projects. It is not expected that the effects of this project or multiple projects can be specifically attributed the cumulative effects on global climate change.

Effects of Climate Change on the Proposed Project

For some management proposals, climate change may affect the project. For example: the effects of decreased snowfall on a ski area expansion proposal at a marginal geographic location, such as a southern aspect or low elevation. However, for this project, no direct, indirect, or cumulative effects from climate change on the proposal are anticipated.

Chapter 4
Persons and Agencies Consulted

Coordination

Steve Belcher	Silvicuture Technician
Lance Coffman	Silviculture Technician
Daniel Crump	Timber Sale Administrator
Becky Finzer	Timber Management Assistant
Susan Hooks	Forest Botanist
Crystal Krapfl	Forester
Horace Lawrence	Timber Sale Administrator
Tom Ledbetter	Forest Trails Program Manager
Ethan Godwin	Engineering Technician
Andrew McCormick	Forest Geologist
Kim Miller	District Silviculturist
David Probasco	District Biologist/Program Manager
Brian Pounds	Wildlife Technician
Mary Rodgers	District Biologist
Derek Rollins	Wildlife Technician
Justus Beggs	Assistant Fire Management Officer
Laura Donaldson	District Archeologist
Chip Stokes	District NEPA Coordinator
Clay Van Horn	Forest Fisheries & Wildlife Biologist
David Whitmire	Heritage Resource Technician
Deanna Younger	Other Resources Assistant

Consultation *Pending*

Caddo Nation
The Osage Nation
Quapaw Tribe of Oklahoma
State Historic Preservation Office
US Fish and Wildlife Service

Chapter 5
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Appendices

(A) Activities List by Compartment and Stand
(B) Project Maps
(C) Road Improvements (Proposed Action)

Appendix A – Activities by Compartment and Stand (Proposed Action)

The following tables list the specific actions proposed for each Forest compartment and stand. All treatments are given in acres. Acreage values are estimates based on best available data; actual treated area may be revised to reflect more accurate field information and stand analysis.

The No Herbicide Alternative would consist of the same treatments as the Proposed Action, except that hand tool or mechanical methods would be employed to accomplish site preparation, release, midstory removal, and non-native invasive plant control.

Location			Proposed Harvest/Silvicultural Activity									
Compartment	Stand	Total Stand Acres	Seed Tree	Commercial Thinning	Commercial Thinning (1st Plantation)	Commercial Thinning (Woodland Development)	Site Preparation	Hand Plant	Precommercial Thinning	TSI Release	WSI Midstory Removal	Management Area
			Treatment acres									
1631	1	187	0	0	0	187	0	0	0	0	0	16
1631	13	132	0	0	0	132	0	0	0	0	0	16
1631	14	29	0	0	0	29	0	0	0	0	0	16
1631	15	9	0	0	0	9	0	0	0	0	0	16
1631	16	67	0	0	0	67	0	0	0	0	0	16
1631	17	8	0	0	0	8	0	0	0	0	0	16
1631	18	46	0	46	0	0	0	0	0	0	0	16
1631	26	25	20	0	0	0	20	20	20	20	0	16
1631	35	9	0	9	0	0	0	0	0	0	0	14
1643	15	107	0	107	0	0	0	0	0	0	0	21
1643	29	42	0	0	42	0	0	0	0	0	0	21
1643	35	50	0	0	50	0	0	0	0	0	0	16
1644	2	42	42	0	0	0	42	42	42	42	0	21
1644	3	78	0	78	0	0	0	0	0	0	0	14
1644	5	152	0	152	0	0	0	0	0	0	0	14
1644	7	40	0	40	0	0	0	0	0	0	0	14
1644	10	18	0	0	0	18	0	0	0	0	0	14
1644	13	44	44	0	0	0	44	44	44	44	0	14
1644	20	27	27	0	0	0	27	27	27	27	0	14
1644	21	40	0	40	0	0	0	0	0	0	0	14
1644	26	17	0	17	0	0	0	0	0	0	0	14

Location			Proposed Harvest/Silvicultural Activity									
Compartment	Stand	Total Stand Acres	Seed Tree	Commercial Thinning	Commercial Thinning (1st Plantation)	Commercial Thinning (Woodland Development)	Site Preparation	Hand Plant	Precommercial Thinning	TSI Release	WSI Midstory Removal	Management Area
1644	27	18	0	0	0	18	0	0	0	0	0	14
1644	29	9	0	0	0	9	0	0	0	0	0	14
1644	33	49	0	0	0	49	0	0	0	0	0	14
1644	36	40	40	0	0	0	40	40	40	40	0	14
1644	39	10	0	10	0	0	0	0	0	0	0	14
1644	42	41	0	41	0	0	0	0	0	0	0	14
1644	44	39	39	0	0	0	39	39	39	39	0	14
1644	49	15	0	0	0	15	0	0	0	0	0	14
1644	50	33	0	0	0	33	0	0	0	0	0	14
1644	51	29	0	0	0	29	0	0	0	0	0	14
1644	56	41	0	41	0	0	0	0	0	0	0	14
1645	2	21	0	21	0	0	0	0	0	0	0	14
1645	6	44	44	0	0	0	44	44	44	44	0	14
1645	11	42	0	0	0	0	0	0	42	0	0	14
1645	14	91	0	0	91	0	0	0	0	0	0	14
1645	15	87	0	87	0	0	0	0	0	0	0	14
1645	20	39	0	0	0	39	0	0	0	0	0	14
1645	21	43	0	0	0	43	0	0	0	0	0	14
1645	26	21	0	0	0	21	0	0	0	0	0	14
1645	29	29	0	0	0	29	0	0	0	0	0	14
1645	36	10	0	0	0	10	0	0	0	0	0	14
1645	37	31	0	31	0	0	0	0	0	0	0	14
1645	40	9	0	0	0	9	0	0	0	0	0	14
1645	41	42	42	0	0	0	42	42	42	42	0	14
1645	43	45	0	0	0	0	0	0	45	0	0	14
1645	44	16	0	0	0	16	0	0	0	0	0	14
1655	1	46	0	46	0	0	0	0	0	0	0	14
1655	8	68	0	0	0	68	0	0	0	0	0	14
1655	13	74	0	74	0	0	0	0	0	0	0	14
1655	16	94	0	94	0	0	0	0	0	0	0	14
1655	17	29	0	0	0	0	0	0	29	0	0	14

Location			Proposed Harvest/Silvicultural Activity									
Compartment	Stand	Total Stand Acres	Seed Tree	Commercial Thinning	Commercial Thinning (1st Plantation)	Commercial Thinning (Woodland Development)	Site Preparation	Hand Plant	Precommercial Thinning	TSI Release	WSI Midstory Removal	Management Area
1655	42	15	0	0	0	15	0	0	0	0	0	14
1655	43	17	0	17	0	0	0	0	0	0	0	14
1655	44	49	0	0	0	49	0	0	0	0	0	14
1655	45	50	0	50	0	0	0	0	0	0	0	14
1655	48	42	0	42	0	0	0	0	0	0	0	14
1655	58	9	0	0	0	0	0	0	9	0	0	14
1655	59	7	0	0	0	0	0	0	7	0	0	14

Appendix B – Project Maps

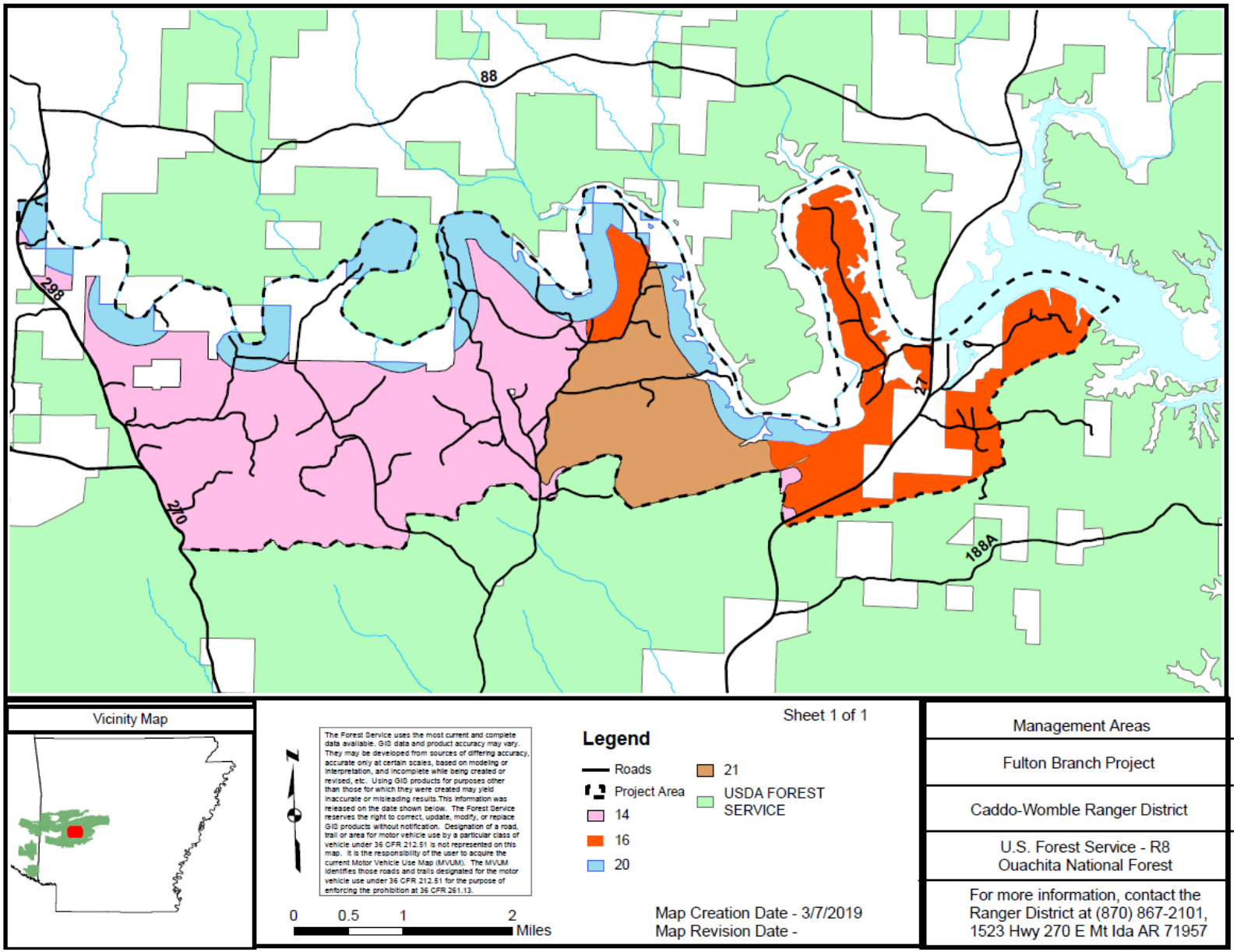

FIGURE 2. MANAGEMENT AREA MAP

Ouachita National Forest
Arkansas and Oklahoma

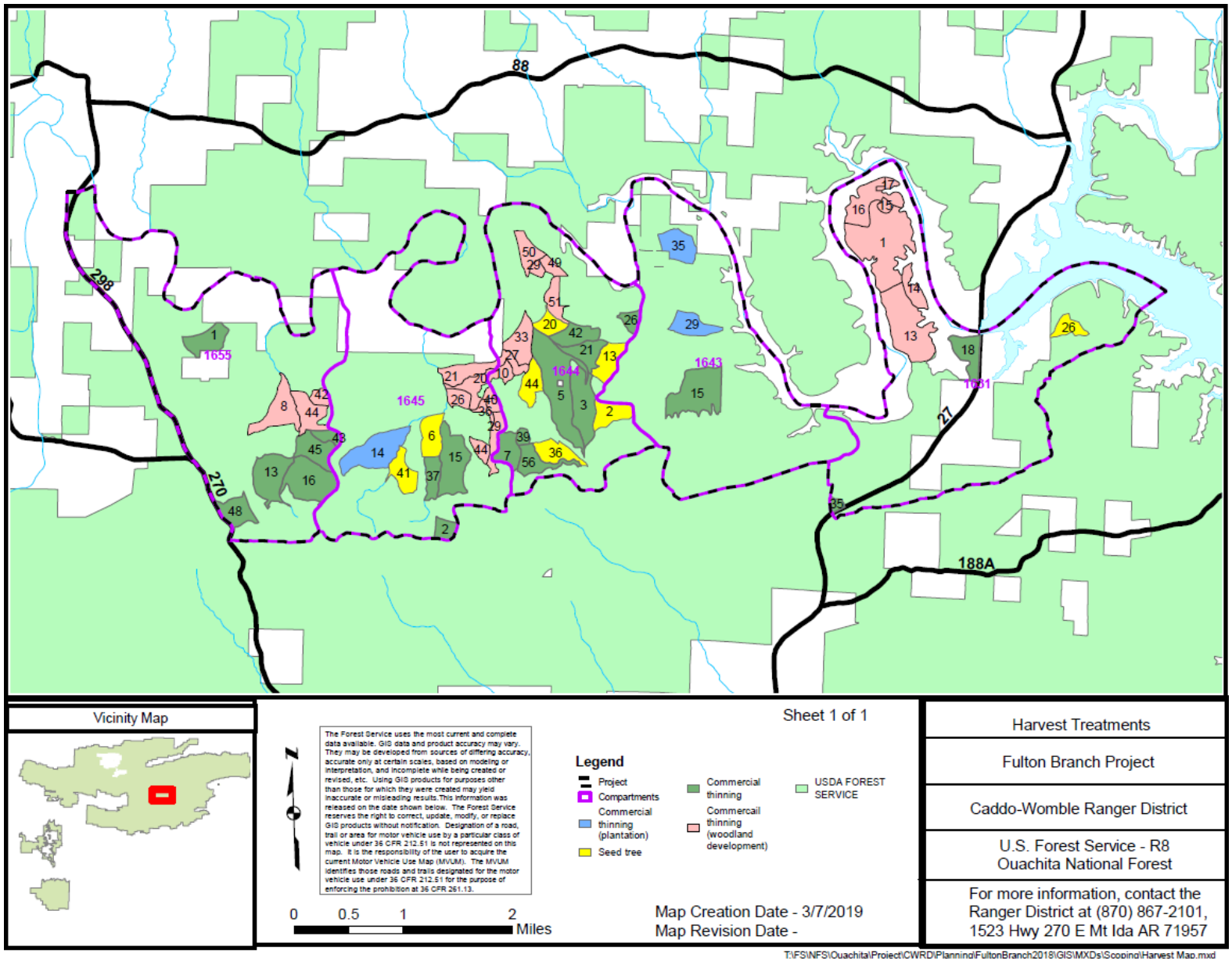

FIGURE 3. PROPOSED TIMBER HARVEST MAP

Ouachita National Forest
Arkansas and Oklahoma

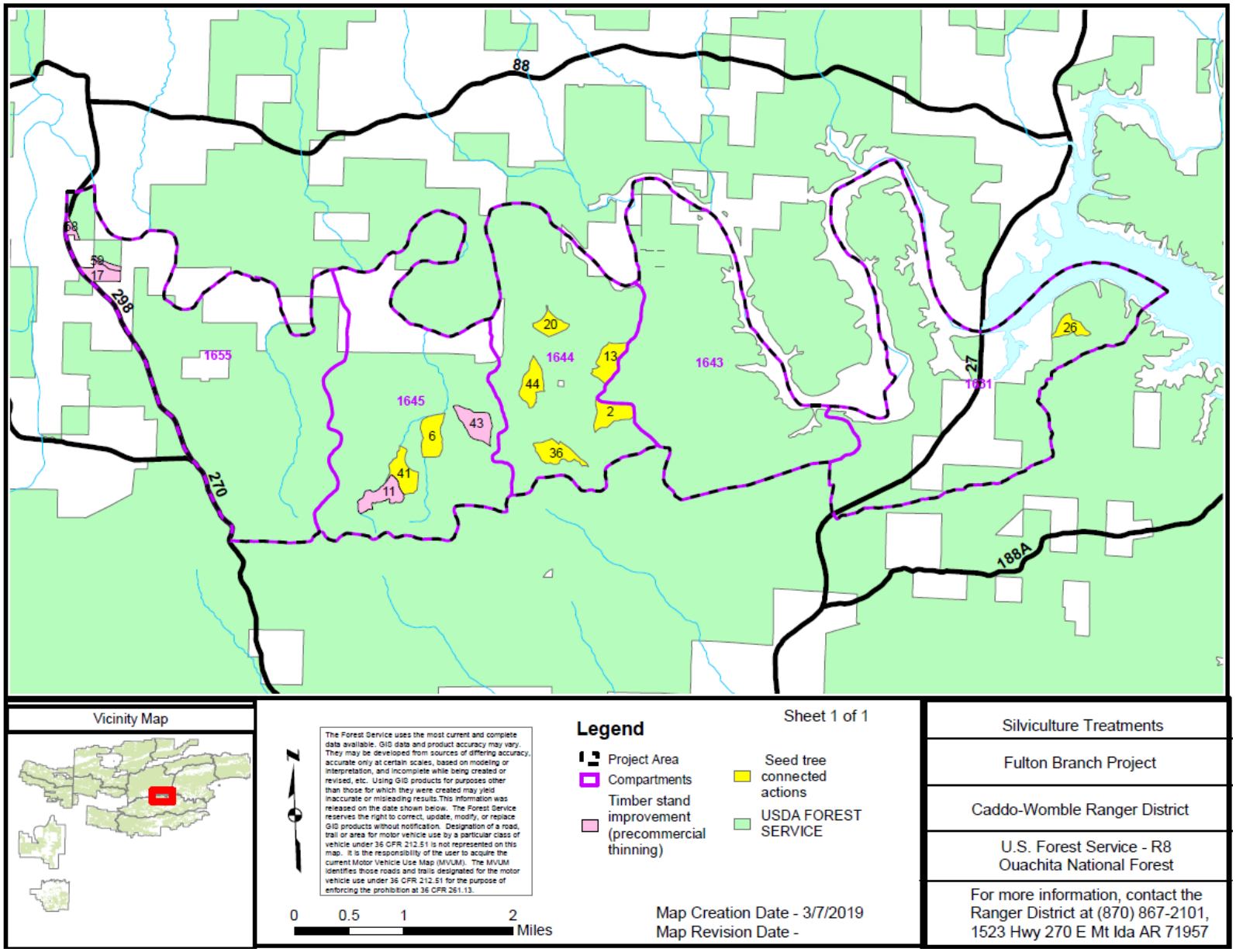

FIGURE 4. PROPOSED SILVICULTURAL ACTIVITIES MAP

Ouachita National Forest
Arkansas and Oklahoma

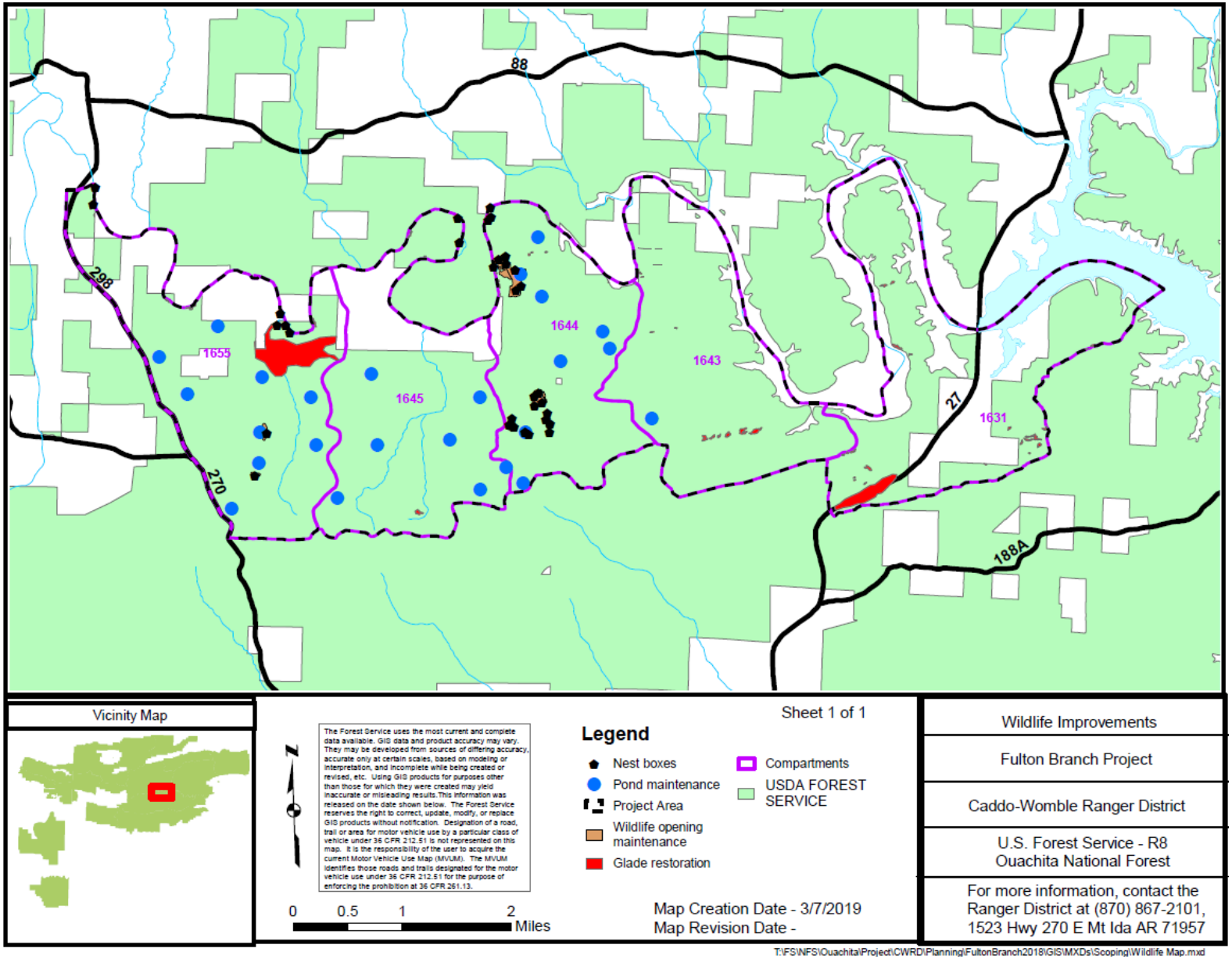

FIGURE 5. PROPOSED WILDLIFE ACTIVITIES MAP

Ouachita National Forest
Arkansas and Oklahoma

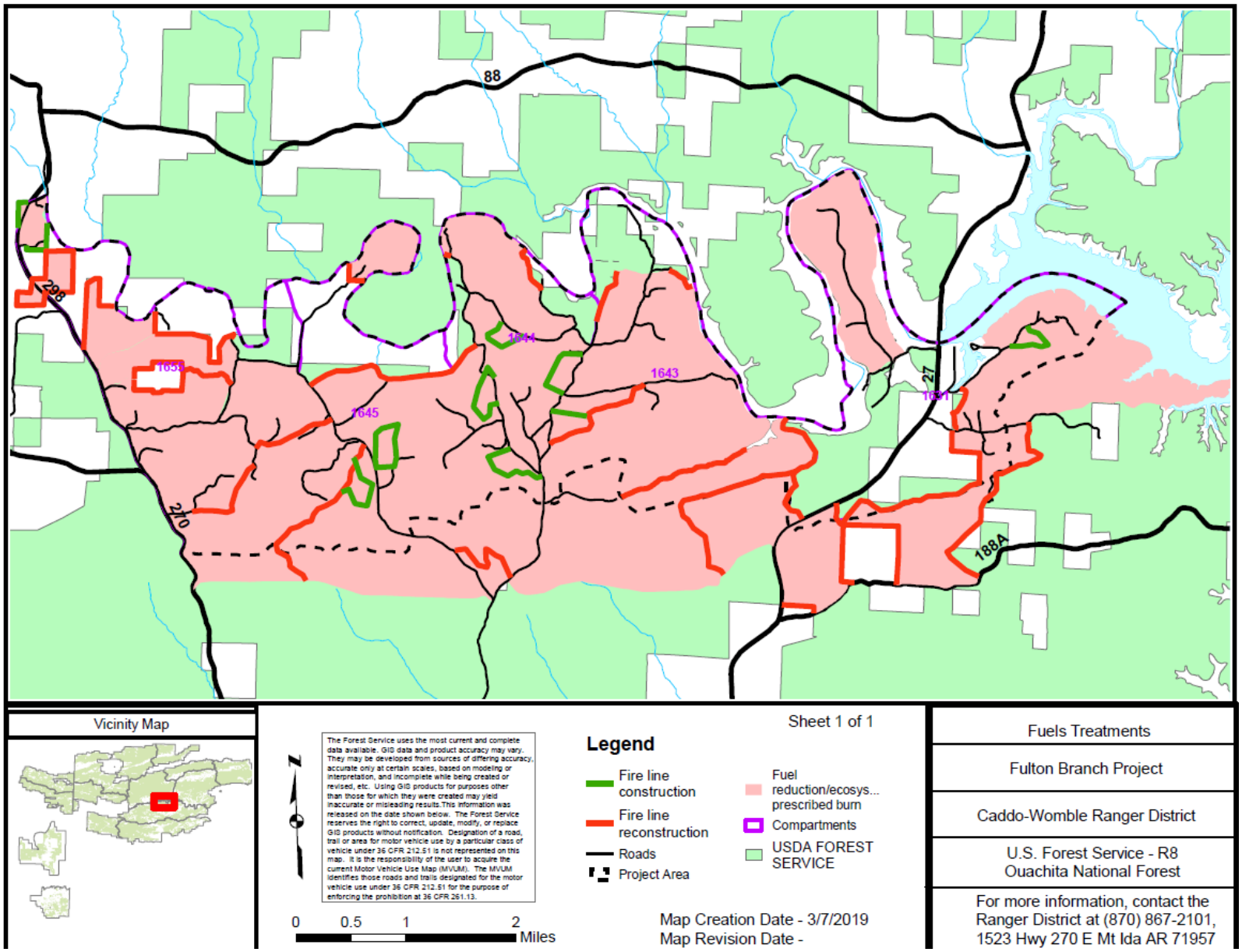

FIGURE 6. PROPOSED PRESCRIBED BURNING MAP

Ouachita National Forest
Arkansas and Oklahoma

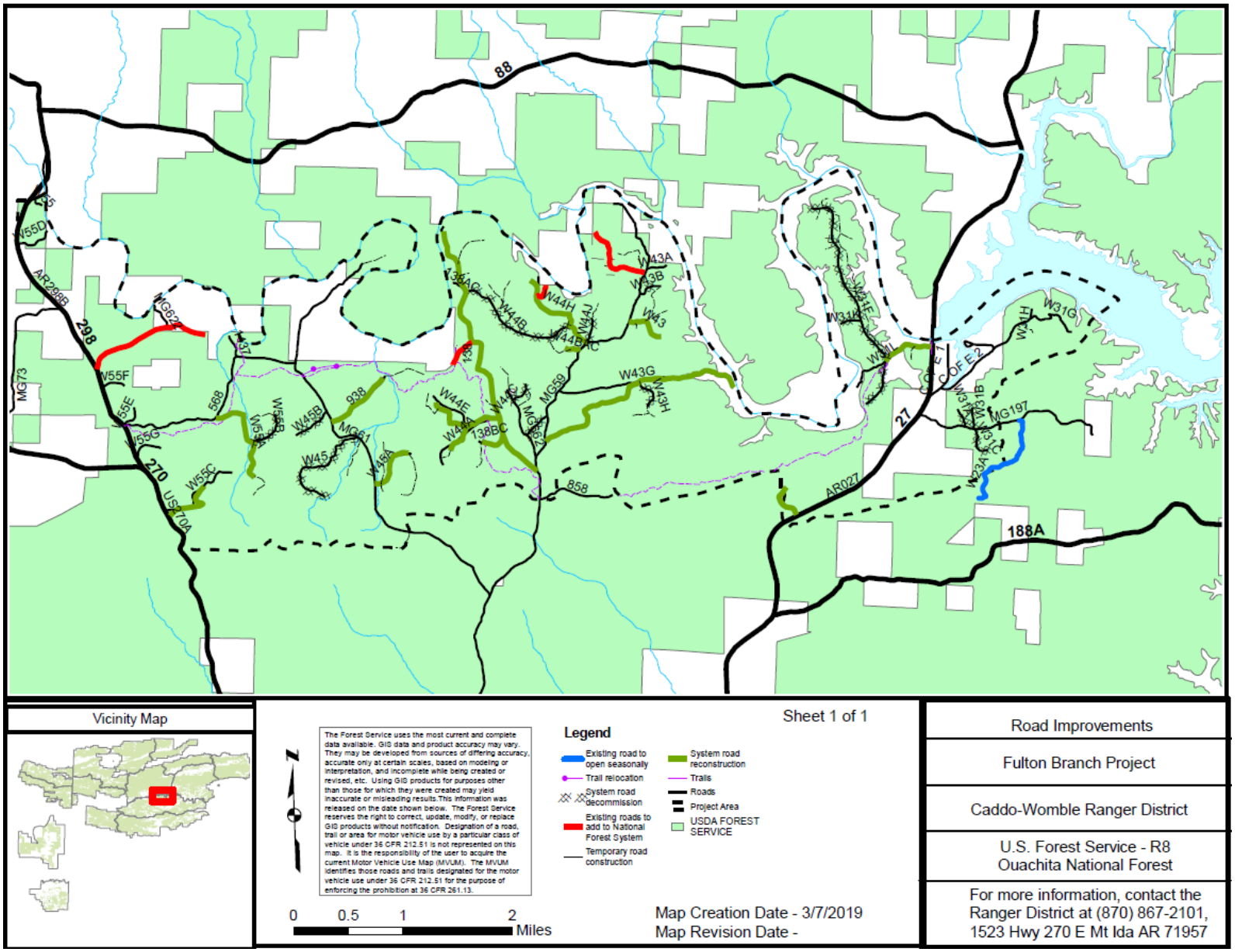

FIGURE 7. PROPOSED TRANSPORTATION ACTIVITIES MAP

Ouachita National Forest
Arkansas and Oklahoma

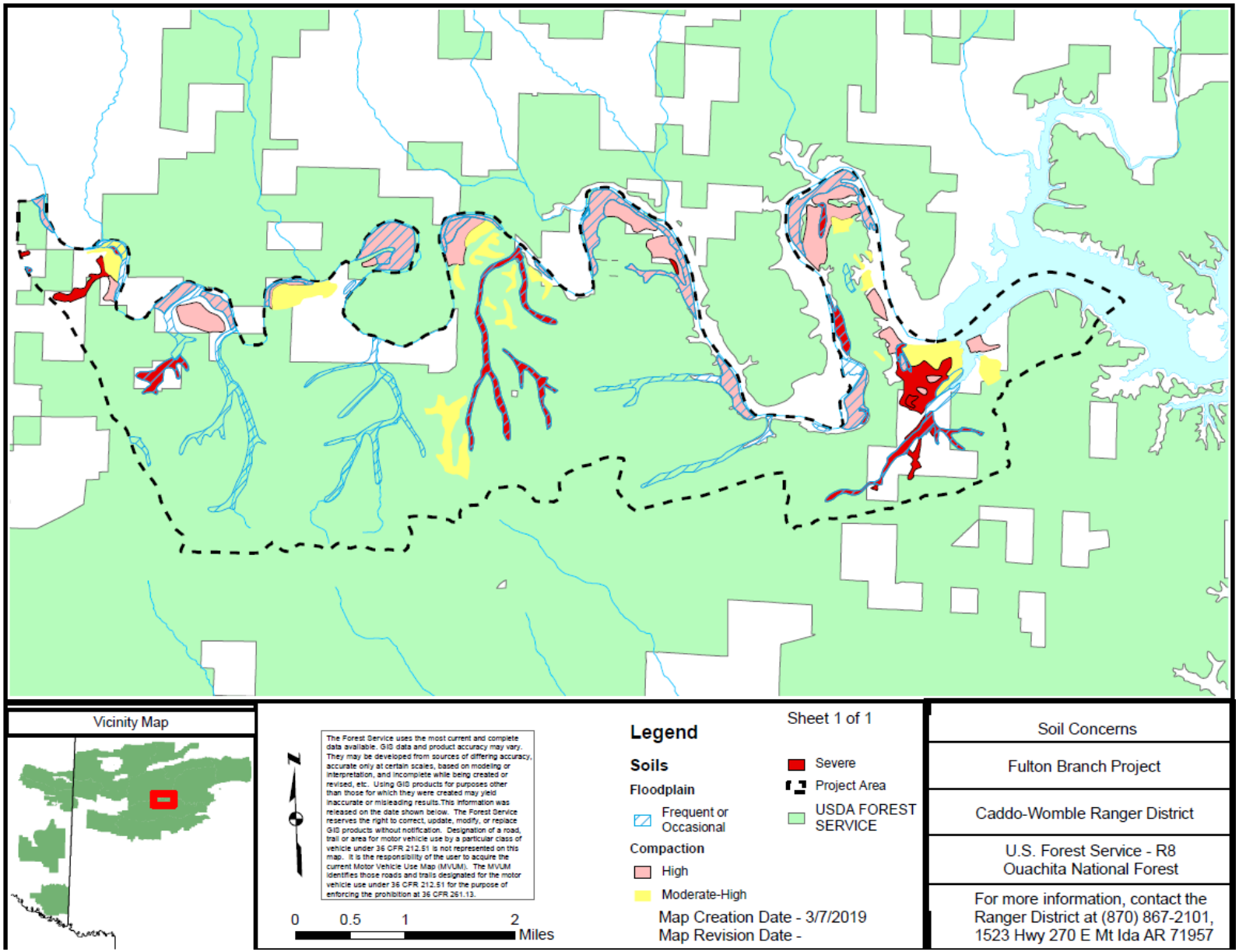

FIGURE 8. SOIL CONCERNS MAP

Ouachita National Forest
Arkansas and Oklahoma

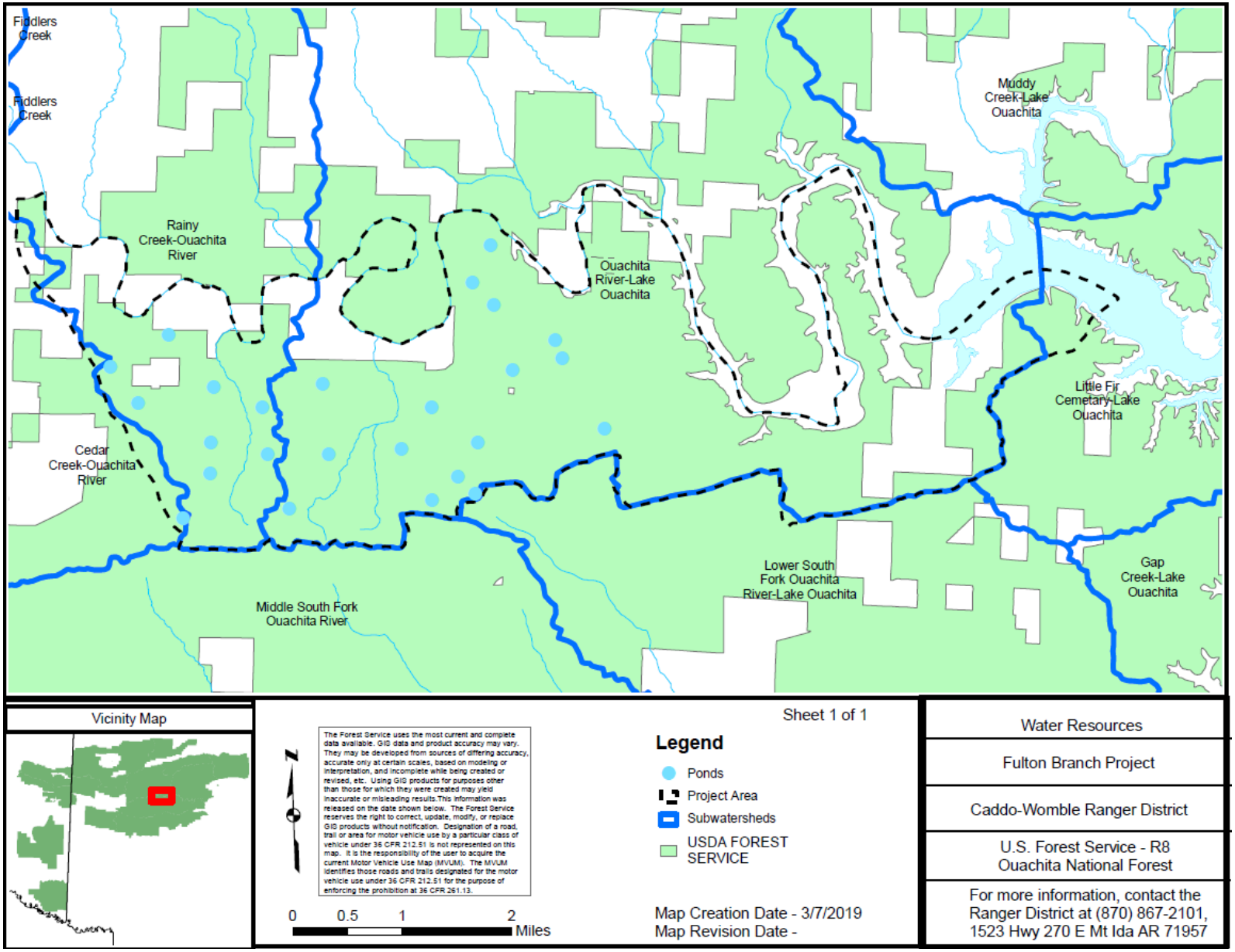

FIGURE 9. WATER RESOURCES MAP

Ouachita National Forest
Arkansas and Oklahoma

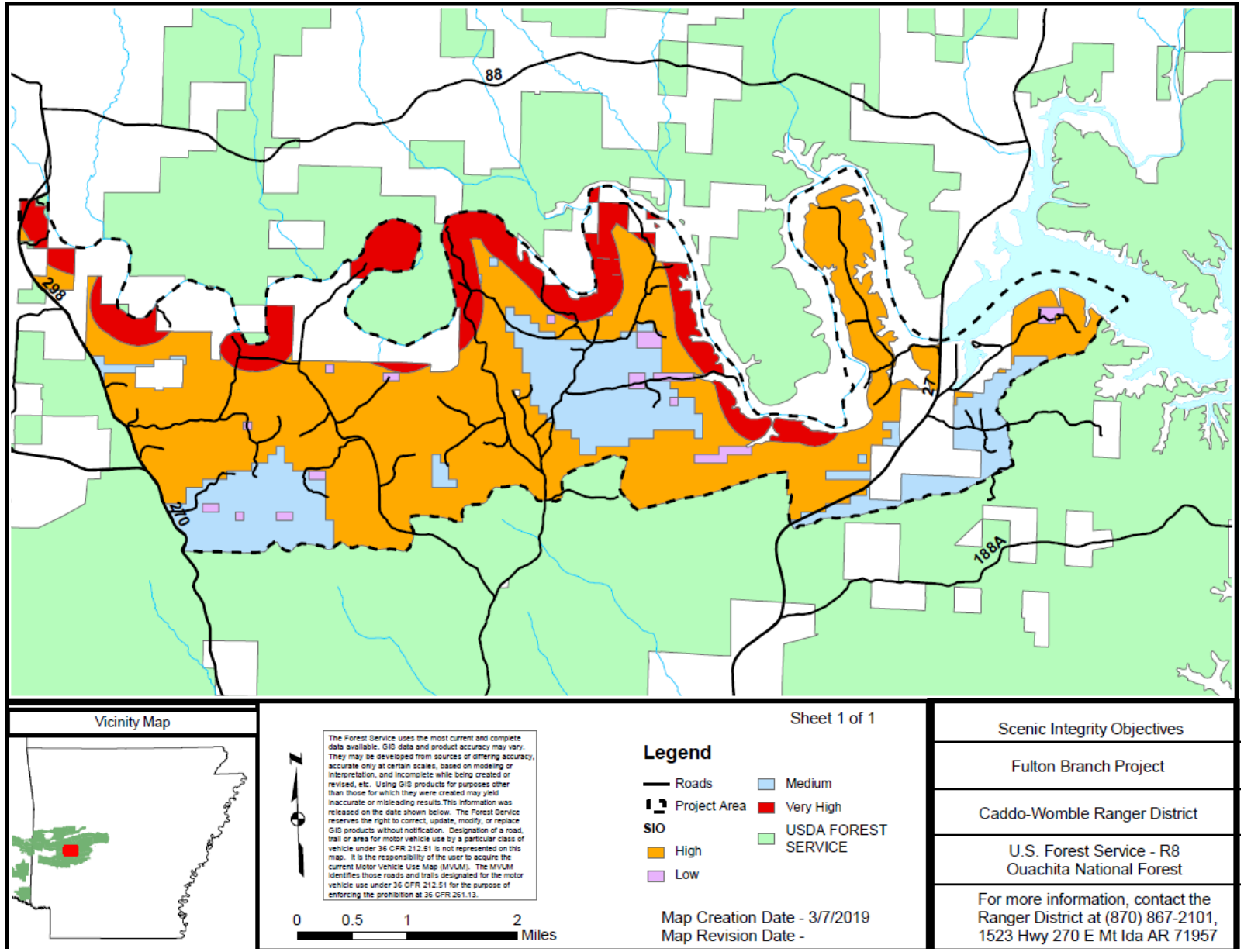

FIGURE 10. SCENIC INTEGRITY OBJECTIVES MAP

Ouachita National Forest
Arkansas and Oklahoma

Appendix C – Road Improvements (Proposed Action)

Decommission

Road Number	Length
W45	1.1
W44D	0.2
W31A	0.2
W31B	0.2
W31C	0.3
W43B	0.2
W44J	0.2
W43H	0.3
W44B	1.2
W31K	0.2
W31F	2.2
W44C	0.2
W45B	0.4
W55B	0.4

Reconstruction

Road Number	Length
W44H	0.9
W43G	1.6
W43	0.4
138	2.6
138BC	0.3
W44A	0.6
W44E	0.4
W45A	0.5
938	0.6
W55A	0.9
W55C	0.6
W44BAC	0.1
W43G	0.5
W31	0.4
W31L	0.5